

THE
GENUS IRIS

W. R. DYKES



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THE GENUS IRIS

TO THE MEMORY
OF
THE LATE SIR MICHAEL FOSTER

PREFACE

IN publishing this book on Irises, I am fully aware that it is not yet possible to give a complete account of the Iris genus. This could only be done by one who had the leisure and the opportunity first of all to go to all the localities in which Irises have been found or in which new species are likely to exist, and then to grow all the species side by side and note their affinities and differences.

Meanwhile, this book contains an attempt to put together the available facts and to indicate the gaps in our information. It is hoped that it may lead to the filling up of some of these gaps and to a more general appreciation of the various species of Iris.

The reader's attention is directed to the explanation given in the Introduction of the method on which the book has been compiled. To the professional botanist this may appear unorthodox in its neglect of local Floras, but this neglect was inevitable in view of the uncertainty that has prevailed as to the definition of the various species.

With regard to the arrangement of the species in groups, it seemed better to take together those plants which are obviously related to one another by their whole appearance, than to pick out some one character or set of characters and base on it an artificial grouping, which would bring together the most widely different species.

This plan has made it impossible to give a really satisfactory clavis or key to the Apogon section, but it is hoped that the definitions of the characteristics of the various groups will be a sufficient guide in assigning an Iris to one or other of them. To each group there will be found prefixed a key to the species included in it.

The illustrations were all taken from plants growing in the open in my garden here, with the exception of *I. Lortetii*, which came from the south of France.

It only remains to say that I shall be very grateful for any criticisms of the information here collected and for help towards a better knowledge of those species with which we are still unfamiliar.

W. R. DYKES

CHARTERHOUSE,
GODALMING
November 1912

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INTRODUCTION

This book is the result of an attempt to find plants that would flower in the open in the winter months in Surrey. The fascination of the first *Iris* flowers that were obtained led to an interest in the whole genus, and it soon became apparent that our knowledge of it was very defective.

In the attempt to remedy this defect, I have refused as far as possible to take anything for granted and have therefore made little use of the various Floras of different districts and regions because investigations into the original descriptions of the various species and acquaintance with the plants commonly cultivated under these names proved that there was very great confusion in *Iris* nomenclature and that it was accordingly impossible to rely on the statements in local Floras to the effect that certain species of *Iris* were natives of certain districts.

The method that appeared most likely to give satisfactory results was first of all to go back to the original descriptions of all the supposed species of *Iris*, amounting to some seven hundred, and to endeavour, with the help of the type specimens, wherever these were available, to arrive at some conclusion as to which of the names were worthy of specific rank and which were to be regarded merely as synonyms.

This puzzling and somewhat tedious task was carried out for the most part in the excellent botanical library of the Kew Herbarium, and I owe a great debt of gratitude to the officials there and especially to Dr Stapf, the Keeper, and to Mr Skan, the Librarian, for their never-failing courtesy and ready help. The former gave me invaluable hints as to method and without the extensive bibliographical knowledge of the latter my search for various obscure references would often have been fruitless.

When I had thus arrived at some idea of the various species, I proceeded to check it by working through all the available herbarium material, which at the same time provided me with details as to the distribution of each species. In arranging my information under the heading of "Distribution," it seemed better to be able to vouch personally for each entry, and I have therefore quoted no specimens that I have not examined myself. Since in nearly every case the date and the collector's name are given as well as the indication of the collection in which the specimen is now to be found, it is hoped that there will be no difficulty in determining what plant I take to be meant by any specific name.

This method has doubtless the drawback that the full extent of the distribution may not always be indicated, but there is perhaps some compensation for this defect in the fact that the errors of local Floras are not perpetuated. The collections examined include those at Kew, in the British Museum (Natural History Branch, South Kensington), at Oxford, Cambridge, Edinburgh, at the Berlin Botanic Garden, and at the Vienna Hofmuseum. In addition, I have examined a number of specimens from the Jardin des Plantes at Paris, from the United States National Museum at Washington, D.C., from M. Léveillé's collection of Chinese plants at Le Mans, a small collection of Italian specimens belonging to Prof. Terracciano and part of the collection of the Imperial Botanic Garden at St Petersburg.

The letter in brackets after each specimen quoted indicates the collection in which the specimen is to be found. The following are the abbreviations used.

- K Kew Herbarium.
- BM British Museum, Natural History Branch at South Kensington.
- O Oxford University Herbarium.
- C Cambridge University Herbarium.
- E The Herbarium of the Edinburgh Botanic Garden.
- B The Herbarium of the Berlin Botanic Garden.
- P The Herbarium of the Jardin des Plantes at Paris.
- V The Herbarium of the Vienna Hofmuseum.
- SP The Herbarium of the Imperial Botanic Garden at St Petersburg.
- L M. Léveillé's Chinese plants at Le Mans.
- W The Herbarium of the United States National Museum at Washington, D.C.
- T A collection, chiefly of Italian specimens, lent to me by Prof. Terracciano.
- HortD Indicates that the plant is, or was, in cultivation in my garden, and in most cases that it came to me direct from the locality named.

If there is one point more than another that has come into prominence in the course of this work, it is the endless confusion that arises from the fact that new plants are described without reference to the most closely allied, previously known species of the same genus. Thus Maximowicz in describing his *I. Bungei* is careful only to distinguish it from *I. songarica* Schrenk, with which no one would easily confuse it; moreover, conveniently for himself, and inconveniently for us, he omits any mention of *I. tenuifolia* Pallas from some specimens of which it is much more difficult to distinguish it.

There is little doubt that, at least in the case of *Irises*, herbarium material, unsupplemented by a knowledge of the living plant, is most misleading, and it has therefore been my endeavour to grow in my garden specimens of all the available species, and to introduce, or reintroduce, into cultivation, species that were not readily obtainable. In this I have been greatly helped by the kindness of many friends and correspondents and take this opportunity of expressing my gratitude to them. The following list of those to whom I am indebted is, I am afraid, incomplete, but any omission in it is certainly not intentional.

Mrs A. J. Adams, Waldo, Oregon.

J. G. Baker, Esq., Kew.

W. Baker, Esq., Oxford.

C. F. Ball, Esq., Glasnevin.

Messrs Barr & Sons, Covent Garden.

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Col. D. D. Cunningham, Torquay.

The Calcutta Botanic Garden.

Mr Walter Deane, Cambridge, Mass.

Mons. F. Denis, Balaruc-les-Bains.

Père Ducloux, Yunnan.

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Mme Olga Fedtschenko, St Petersburg.

Prof. M. L. Fernald, Cambridge, Mass.

Dr A. Fomin, Tiflis.

The late Sir Michael Foster.

George Forrest, Esq., Midlothian.

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The late W. E. Gumbleton, Esq., Queenstown.

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Sir Arthur F. Hort, Bart., Harrow-on-the-Hill.

Captain Terence Keyes, Quetta, Baluchistan.

C. C. Lacaita, Esq., Midhurst.

The late Max Leichtlin, Baden Baden

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Sir John F. Rotton, Godalming.

Mons. A. Schelkownikow, Chaldan.

Herr F. Scheubel, Oberlahnstein.

Herr W. Schreiber, Bozen.

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Mr C. G. van Tubergen, Junr., Haarlem.

Dr J. Velenovsky, Prague.

Mons. Philippe de Vilmorin, Verrières-le-Buisson.

Dr R. Wagner, Vienna.

Dr A. Fischer von Waldheim, St Petersburg.

Messrs R. Wallace & Co., Colchester.

Dr R. v. Wettstein, Vienna.

Miss E. Willmott, Great Warley.

G. Yeld, Esq., York.

Dr A. Zahlbrückner, Vienna.

My greatest debt of all is due to the late Sir Michael Foster, who encouraged me to undertake the investigation into the whole genus. My acquaintance with him was all too short, but it was long enough to make me appreciate that generosity with which he placed his knowledge and his plants at the disposal of those who followed in his footsteps. We can never cease to regret that he himself found it impossible to give us a monograph on the *Iris* genus but he was always unwilling to take any steps towards this end.

At his death, there passed into the hands of Miss Willmott of Warley Place, about a dozen rough notebooks, containing accounts of some of the *Irises* that flowered in his garden at Shelford and illustrated by accurate pencil drawings of the flowers. For some years every plant or packet of seeds that Foster received was identified by the date of the year in which it reached him and by a letter of the alphabet, e.g. 88 D or 90 EE, and a page was devoted to it in one or other of the notebooks. Each entry usually begins with a note of the appearance of the rhizome or seeds and sometimes ends abruptly with the laconic expression "All died." In other cases minute descriptions are added as the plant developed and flowered, and it was these descriptions that Foster published, when any

of the plants turned out to be a new species. This is obvious if the notes are compared with his published descriptions in the Gardener's Chronicle, the Botanical Magazine and elsewhere, for the phraseology is identical or only slightly modified.

These notebooks have been most kindly lent to me by Miss Willmott, and I owe much to the insight into Foster's methods which I have derived from the perusal of them. Unfortunately they have proved to contain little information that is not already available in one or other of the above-mentioned publications. In other words, the only cases in which a complete description of a species is given are precisely those in which Foster himself published the plant as new. In other cases, it is provoking to find a plant described by some such entry as the following, "practically a yellow *Notha*" or "a form of *tolmeiana*," because we nowhere find any definition of what Foster himself understood by these names. These concepts, which existed in his mind, were never recorded, and their loss has deprived his notes of much of their value.

Here and there, however, the notes have given unexpected help in clearing up difficulties, as for instance in the case of *I. masia*. This was known to Foster as *I. masiae*, though the name apparently meant nothing to him. He merely recorded that he received a plant bearing this name from Max Leichtlin and gave an incomplete description of it, when it subsequently flowered. Two or three years ago I was fortunate enough to find in the Kew Herbarium an undetermined *Iris*, discovered by Sintenis near Suverek in Asia Minor, which I recognised as being identical with Foster's *I. masiae*. It is well known that Max Leichtlin often obtained plants and seeds from Sintenis and the missing link in our information was supplied by the discovery that a range of hills known to the Ancients as Mons Masius lies close to Suverek. Sintenis' herbarium specimens do not tell us much of the flowers, but with their aid and with Foster's notes we are able to compile a fairly full account of this interesting species¹.

Except in a few cases of this sort, Foster's notebooks have been of little direct use for the reasons already explained, but I have endeavoured to acknowledge my debt whenever I have derived any information from them.

An apology is perhaps due for the unsatisfactory state in which the accounts of some of the most widely distributed *Iris*es have been left. The difficulty lies in the fact that of such species as *aphylla*, *ruthenica*, *ensata* and *spuria* there appear to be almost innumerable local forms, which cannot satisfactorily be separated when dealing only with dried herbarium specimens. Living and indeed growing plants are absolutely necessary and, though by diligent search in gardens, many of these forms can be got together, it is by no means easy to obtain a series of wild forms from known localities. Even when wild plants or seeds are procured, it is necessary to grow them side by side for a year or two before their true characters can be seen, for soil and cultivation have often great influence on the growth of the plants, which usually seem to grow much more luxuriantly than in the wild state. This is not always the case, however, for in some rich natural soils, specimens are to be found that are as luxuriant as any cultivated plants and which, as herbarium specimens, appear at first sight to be distinct from the dwarf plants that form the majority. *Iris ruthenica* is a good instance of this variability. In favourable conditions the stems produce two flowers while in weaker plants each stem produces only a single flower. There is, however, no ground for setting up a separate form or even species under the name of *uniflora*, when all specimens agree in the character of the foliage, spathes, capsule and seeds. The last are peculiar and unlike those of any other known *Iris*. It is, moreover, a curious fact that at least among the beardless *Iris*es, each species has characteristic seeds by which it can readily be recognised, and we therefore seem justified in grouping together under one specific name the various local forms of this *Iris* that undoubtedly exist.

In the same way *I. ensata* is very variable, but all the forms are at once distinguishable from all other species by the curious capsule (see Fig. 11, p. 87). The case of *I. aphylla* is, perhaps, more difficult, but, at present, it seems advisable to group together under this name all dwarf bearded *Iris*es from Central Europe and the Caucasus in which the stem forks either low down near the ground line or at any rate below the middle. No other bearded species has a lateral branch, which is nearly as long as the main stem, and the change that a year's cultivation produced in collected rhizomes from the Caucasus makes it very inadvisable to attempt at present any definite grouping of the various forms of this species².

In the case of *I. spuria* some attempt has been made to separate several of the various forms, but it is necessarily incomplete and tentative.

It is somewhat surprising that the professional botanist should so frequently be entirely lacking in horticultural enterprise. It is true that this lack of enterprise can often be accounted for by considerations of time and space, but yet it is remarkable that there is so seldom any opportunity afforded for working out with living plants in a botanical garden the problems that arise in the herbarium. Doubtless, the specialist is apt to attach an altogether exaggerated and entirely unjustifiable

¹ I have since found both in the Vienna and in the Paris collections further specimens collected by Sintenis with the name *I. masia* suggested by Dr Stapf, who, however, never published any description of the species.

² Bieberstein's description of *I. furcata* makes the spathes one-flowered and the withered stem on collected plants confirmed this, but after a year's cultivation in my garden two flowers in a spathe were common. This instance serves to show the difficulty of distinguishing and grouping the local forms.

importance to his own particular branch of a subject, but it is impossible to deny the proposition that no satisfactory definition of a botanical species can be given without a knowledge of the behaviour of the plant under varying conditions of growth, in the wild state and in cultivation, and of the extent to which seedlings may vary within the limits of the species.

It has therefore been my endeavour to obtain plants or seeds of as many species as possible direct from the localities from which the types of the species were originally obtained and then to observe their behaviour under cultivation. Seedlings of as many species as possible have also been raised in order to determine the limits of their variability. In analysing the results thus obtained, it has been impossible to avoid feeling how utterly the Mendelian laws have shaken the basis on which our ideas as to what constitutes a species were founded. It can no longer be accepted that any Iris that breeds true from seed is a species, for Mendelian recessives necessarily breed true when self-fertilised. This has been abundantly proved by such instances as those of the white forms of *I. tectorum*, *I. sibirica*, *I. orientalis*, etc., among seedlings of which no blue flowered plants have been known to appear. And yet these white forms cannot be called species for they only differ from the type in the absence of the blue colouring matter. Even such a form as *I. versicolor kermesina*, with flowers that are almost crimson, breeds true to that colour when self-fertilised and so does the form of *I. pseudacorus* in which the brown markings on the falls are absent. Yet neither deserves specific rank.

It is useless to pretend that the task of establishing the boundaries of each species is accomplished, for many Iris species are still unknown except as herbarium specimens and of others, for instance of the *Oncocyclus* species, it seems impossible in England to raise seedlings on any adequate scale. On the other hand, it seemed better to publish the results already obtained in order that help may be invited in dealing with the less known species. It is obvious that it is of very great assistance to obtain either living rhizomes or seeds of any wild Iris, especially if accompanied by a note of the exact locality in which the plants or seeds were collected and possibly also by some indication of the conditions of soil and environment under which they were growing¹.

It has in many cases seemed inadvisable to give very accurate measurements of the various parts of the different Irises, because the dimensions are liable to very considerable variation under varying conditions of position, cultivation, climate, etc. What are really important are not the absolute but the relative proportions of the various parts and therefore it would be misleading to give definite measurements². Even seeds are liable to great variation and the drought of 1911 was enough to reduce by one half the size of the seeds of the tall *I. spuria* from Kashmir, illustrated at Plate XV, although the plants had not been disturbed. It is for this reason that little weight need be given to such contentions as that the mere size of the seeds is enough to distinguish *I. caroliniana* Watson as a species from *I. versicolor* L. Different conditions of soil and moisture are quite enough to account for the differences in size given by Watson and he does not seem to have insisted on any other real difference.

It might have seemed desirable to include a calendar showing the dates at which the various species may be expected to flower and indeed I had collected data for such a list. Eventually, however, further knowledge of the behaviour of species in such widely separated districts as Edinburgh, Surrey and Hérault and the extraordinary effects in my garden of the hot spring weather of 1912 showed that the limits of the flowering season of each species would have to be so widely separated as to render any such list as was contemplated of little or no value.

¹ For methods of packing and treatment of freshly imported plants, see p. 16.

² There are a few exceptions to the rule that the relative measurements of the parts of an Iris do not vary to any appreciable extent. One of the most striking examples of such variation is *I. subbiflora* (see p. 145).

THE LITERATURE OF THE IRIS

The Iris in Pre-Linnaean Literature.

The earliest extant picture of an Iris is probably that on p. 147 of the Vienna Codex of Dioscorides. This appears to have been written and illustrated at the beginning of the sixth century A.D., and it has recently been made more generally accessible by the typographical reproduction that was published at Leyden in 1906. Although in this work the variety of the colours to be found among Iris flowers is mentioned, it is not as garden plants that Irises are considered but as the source of drugs. The multiplicity of the ailments for which Iris preparations are prescribed is truly astonishing. Freckles are removed, ulcers cured and filled with flesh; sleep is induced and tears produced; the gynaecologist relies largely upon them. Indeed, Dioscorides concludes, Irises are very useful generally¹.

The rhizomes are to be prepared by being cut into pieces, dried in the shade and then threaded on strings and stored away.

These directions are repeated in terms that are so nearly identical with those used by Dioscorides as to leave little doubt concerning the source of the recommendations in the New Herball of Wylliam Turner, Phisician unto the Duke of Somersettes Grace, which was published in London in 1551. At p. 23 of Part II of this work, under the heading "Of flour Delyce or flour Deluce," occur the directions for drying and storing the rhizomes, while at p. 171 we read "Of Xyris or Spourgwurt; The vertues of the Diche bur. The dich bur is good to be layd unto swellings. The broth of it, if it be sodden wyth wyne, fasteneth louse teth, if the mouth be wasshed therewyth."

Twenty-five years later, in 1576, Carolus Clusius published the first work² that shows an intimate knowledge of Irises as flowering plants. This was an account of some rare plants, several of which he had discovered in Spain and Portugal. In nearly every case Clusius' observations are so exact that it is easy to recognise the plants to which he refers. The following is the list of the species:—

1. *I. bulbosa latifolia* = *I. alata*.
2. *I. bulbosa angustifolia flore vario* = *I. xiphium*.
3. *I. bulbosa angustifolia luteo flore* = *I. xiphium* var. *lusitanica* or possibly *I. juncea*.
4. *I. bulbosa angustifolia flore purpureo* = *I. xiphioides*.
5. *Sisyrinchium majus et minor* = *I. sisyrinchium* and its small variety with a single leaf.
6. *I. lusitanica seu biflora* = *I. subbiflora* Brotero.
7. *I. humilis latifolia* = *I. chamaeiris* (obtained apparently from Montpellier).
8. *I. angustifolia major* = *I. spuria* var. *subbarbata* Joo.
9. *I. angustifolia media* = *I. spuria* var. *maritima* Lam. probably, although, in his next work, Clusius gives the name to what was undoubtedly *I. sibirica* Linn.

Of *I. alata* he tells us that it has a stemless flower in the midst of the leaves, that an albino form sometimes occurs, and that when introduced to Northern Europe it fails to flower,—a reputation that is usually maintained even now by imported plants after their first season.

His Spanish Iris has blue falls with a yellow blotch and standards of a paler purplish blue, and the yellow-flowered plant which came from near the Tagus above Lisbon had a shorter stem and more slender leaves. This might be *I. juncea*, but the bulbs now obtained from that locality appear to be small yellow-flowered forms of *I. xiphium*, to which the name *I. lusitanica* has been given.

Clusius' account of *I. xiphioides* explains why the plant has also been known as the English Iris. He tells us that he had thought that the plant was a native of England, and that Lobel had told him that he had first seen it at Bristol. Thither he had accordingly journeyed and searched the fields in vain for the plant. He rightly concluded that the Iris had been brought to Bristol by Spanish ships trading with that port.

¹ καὶ καθόλου εἰσι πολύχρηστοι.

² See the bibliographical lists at p. 8

The name *biflora* was applied by Clusius to the Iris (*I. subbiflora* Brot.) that he found flowering near Coimbra in November, and we have no difficulty in recognising the plant, which is entirely distinct from the Central European *I. aphylla*, with which it has been confused from the time of Linnaeus. It is much more closely allied to, if not identical with, *I. pseudopumila* (see also p. 141).

I. angustifolia major is identified with *I. spuria* by its capsules "with prominent twin ridges at the angles" (cf. Fig. 5, p. 58).

Seven years later, in 1583, Clusius published an account of some plants that he had observed in Austria and Pannonia. The first of these is *I. susiana*, which had been introduced to Vienna from Constantinople by an Austrian ambassador in 1573. *I. variegata* is also noticed, and *I. exotica camerarii* is probably one of the forms now known as *sambucina* or *squalens*, which are apparently of hybrid origin, with *I. variegata* as one parent (see also p. 173).

At p. 248 we find an *I. caulifera purpurea*, distinguished by the fact that its stems rise not from the midst of the leaves but apart from them. This is probably the earliest account of *I. aphylla* Linn. (see also p. 157).

Among his *Chamaeiris* Clusius includes both the plants that we now know as *I. chamaeiris* and *I. pumila* and thus started a confusion, which is still the despair of the gardener (see p. 141).

Of beardless Irises we find *I. spuria*, *I. sibirica* and *I. graminea* grouped together as major, media and minor forms of an *I. angustifolia* (see also pp. 58 and 67).

Some of Clusius' species were illustrated by woodcuts (e.g. *I. lusitanica* = *I. subbiflora*, *Hisp.*, p. 282), and in those days, when once a block was made, it seems to have been freely lent and borrowed. Thus we find that many of Clusius' figures are identical with those that occur in Lobel's works and *vice versa*. In Lobel's *Icones Stirpium*, published at Antwerp in 1591, we find in addition to Clusius' species *I. (Hermodactylus) tuberosa* (p. 98), *Xyris et Iris agria Theophrasti* (= *I. foetidissima*, p. 70), *Acorus nostra palustris* (= *I. pseudacorus*, p. 58), and, possibly, on p. 59, *I. germanica* and *I. florentina*.

In 1601 Clusius published at Antwerp his general history of the Rarer Plants, but the list of Irises given in this work contains no important additions. The same may be said of the series of Iris figures contained in the *Hortus Eystettensis* of 1613. Indeed, most of the figures given there bear a curiously close resemblance to those in the earlier works that have been already mentioned. In some cases the names have been changed and noticeably that applied to the Portuguese bearded Iris which has become *I. portugolica*, while the name of *I. biflora* is now applied to the Central European *I. aphylla*.

The next important book for the history of Iris names is Caspar Bauhin's *Pinax Theatri Botanici*, which was published at Bâle in 1623. Its importance does not lie in the information that is contained in it, for it is a mere compilation from earlier works, but in the fact that it forms the connecting link between Linnaeus and the earlier writers. Linnaeus himself does not quote Clusius, but the majority of the Linnaean species of Iris can be traced back to him through Bauhin's *Pinax*.

The Linnaean Herbarium.

The specimens of Iris in Linnaeus' collection, which is now preserved at the Linnaean Society in London, represent about twenty-four species. The collection was probably made many years after the appearance of the first edition of the *Species Plantarum* (1753), for those which are dated are all posterior to 1770. Moreover, the discrepancies between the plants as named in the collection and Linnaeus' published descriptions, lead us to infer that he can hardly have had these specimens before him when the descriptions were written. Indeed, apart from Pallas' specimens, which are, if not the actual types, at any rate duplicates of them, very nearly half of the Linnaean specimens appear to be wrongly named, as the following list shows.

Species of which the specimens agree with the descriptions in the *Species Plantarum*

Specimens wrongly named

Pallas' species

I. susiana

I. pumila (α) = *I. flavissima*

I. dichotoma

I. variegata

(β) = *I. chamaeiris*

I. tenuifolia

I. pseudacorus

I. biflora = *I. aphylla* (see p. 158)

I. ventricosa

I. foetidissima

I. ochroleuca = *I. pseudacorus* var.

I. halophila

I. virginica

I. verna = *I. prismatica* (?)

I. flavissima

I. graminea (α)¹

I. graminea (β) = *I. ruthenica*

I. ruthenica

I. spuria

I. persica = *I. alata*

I. sp. an spuria ? (= *I. ensata* Thb.)

I. sibirica

I. alba = *I. xiphoides*

I. pumilae affinis (= *I. tigridia* Bge.)

I. germanica (?)²

I. sp. "aestiva" (= *I. laevigata* Fisch. and Meyer)

¹ *I. graminea*. There are two specimens bearing this name, of which one is correctly determined while the other is *I. ruthenica*.

² *I. germanica*. This specimen hardly represents what we now know in England as the typical *germanica* but it only differs in the comparative shortness of the lower lateral branch and in the somewhat dwarf habit.

The Iris in Post-Linnaean Literature.

After the appearance of the first edition of Linnaeus' *Species Plantarum* the number of known Irises was increased by the results of Pallas' journey in Northern Asia, of which an account was published between 1768 and 1773. The species then discovered include *I. tenuifolia*, *I. setosa*, *I. ventricosa* and *I. flavissima*, and a few others which at the time were wrongly identified with previously described plants.

In the first half of the nineteenth century several of the groups of Irises, which we now look upon as subgenera, were described as genera. Thus the name *Evansia* was published by Salisbury in 1805 in the first volume of the Transactions of the Horticultural Society of London, and that of *Oncocyclus* by Siemssen in Mohl und Schlecht's *Botanische Zeitung* for 1846 (iv. p. 706).

The first real attempt to classify all the known species of the genus was made by Alefeld and published in the *Botanische Zeitung* for 1863 (xxi. p. 296). In this, one group was based on the shortness of the standards, another on the two-pointed stigma, and even one on the length of the perianth tube, regardless of the other features of the plants. This last group was named *Neubeckia*, apparently for no other reason than to honour the name of a friend, who happened to be celebrating his hundredth birthday. As the *Neubeckia* group contained such totally dissimilar species as *stylosa* (*unguicularis*), *reticulata*, *tenuifolia*, *scorpioides* (*alata*) and *humilis*, it is not surprising that the system did not meet with general approval.

Nine years later, in 1872, Klatt of Hamburg published a further revision of the Iris genus in Vol. xxx. p. 496 of the same publication. Klatt's classification of the species was based largely on the character of the capsules, but this, unchecked by any regard for other characters, brought together such species as *spuria*, *lacvigata* and *graminea*, and *foetidissima*, *ventricosa* and *notha*. Moreover, there is a presumption¹ that the work was done without much acquaintance with the living plants, and to pick out certain characters from the descriptions of different plants by different authors is obviously an unsatisfactory method of procedure, owing to the fact that different observers attach supreme importance to different features in the plants with which they are dealing.

In 1876 Baker published a series of articles on Irises in the *Gardener's Chronicle*, the matter of which was condensed into an article in Vol. xvi. (1877) of the *Journal of the Linnaean Society*. In this account, the bulbous species are still separated under the generic name of *Xiphion*, and subdivided in a way that left no place for such bearded bulbous species as *I. Boissieri* and *I. Tiberghiana*, which were not then known.

In 1880 Maximowicz published in Vol. xxvi. of the *Bulletin of the Academy of St Petersburg* an account of the various Asiatic Irises, based to a large extent on the material collected by such travellers in Asiatic Russia and China, as Mme Fedtschenko, A. Regel, Przewalski, and others.

About the same time Foster began that work among Irises as garden plants that was carried on until his death in 1907. Through his enterprise many species were introduced into England, which he obtained in many cases from Max Leichtlin of Baden Baden, and in others from Dr Regel of St Petersburg.

Foster's work in the garden supplemented that of Baker in the herbarium, and in 1892 the latter published his final review of the Iris genus in his well-known *Handbook of the Irideae*. In this work there were brought together the references to the first publication of the various species and to some of the subsequent notices of them. This was a necessary preliminary to any real study of the genus and, if fuller knowledge of the living plants has made it impossible to follow very closely Baker's arrangement of the species, our debt of gratitude to him is none the less real.

Baker's *Handbook* was written for the botanist to whom the actual flowers are often of little importance or interest. It remained for the Curator of the Cambridge Botanic Garden (R. Irwin Lynch) to put into more popular form the information therein contained. This led to the publication of *The Book of the Iris* in 1904. This in its turn was followed in 1907 by a somewhat similar treatment of the subject in French by Correvon and Massé, which has helped to spread a knowledge of the genus in Continental gardens. Early in 1912 there was published in the "Present Day Gardening" Series a small volume dealing with Irises as garden plants.

¹ This presumption is based on a number of mistaken identifications in the herbarium of the Berlin Botanic Garden.

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THE STRUCTURE, DISTRIBUTION AND CULTIVATION OF THE IRIS

The structure of the Iris flower.

Of the three tribes into which the family of the Irideae is divided, the first is defined as having the style branches placed opposite to the stamens, and not alternately with them as in the *Crocus*. This first tribe is divided into two divisions, in one of which the stigma is a transverse lip overtopped by style crests while in the other it terminates the style branch. The *Iris* belongs to the former of these two divisions, which has in its turn two subdivisions, the one for those plants whose inner perianth segments are convolute, and the other for those with unrolled segments. This last subdivision is made up of the genera *Iris*, *Hermodactylus* and *Moraea*. Of *Hermodactylus* there is only one species, often known as *Iris tuberosa*, which differs from the true Irises in that the divisions of the placenta to which the ovules are attached do not meet to divide the ovary into three cells.

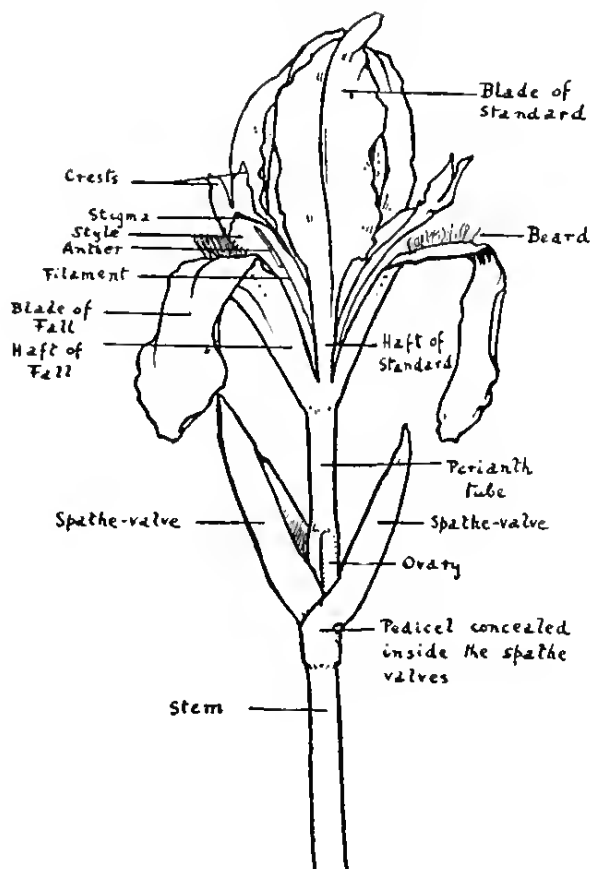


FIG. 1. Structure of the *Iris* flower.

The distinction between an *Iris* and a *Moraea* is to be found in the presence in the former of a perianth tube formed by the base of the segments above the top of the ovary. In *Moraeas* the segments of the flower spring direct from the ovary and do not grow together for some distance to form the tube before branching out. Even in such species of *Iris* as *xiphium* in which the tube is very short, it will be found that the withered flower comes away from the swelling capsule in one piece and that the six segments do not fall separately like the petals of a rose. It is this distinction between an *Iris* and a *Moraea* that makes it necessary to include among the Irises *I. sisyrinchium*, which resembles the *Moraeas* in so many ways and which is moreover so unlike all other Irises¹. If it were not for this difference, *I. sisyrinchium* would be a *Moraea* and would form the only exception to the rule that Irises occur in the North Temperate Zone and *Moraeas* in the corresponding region in the South.

Thus, in the *Iris*, at some distance above the ovary the tube branches out into an inner and an outer series, each of three segments, which may be conveniently named "standards" and "falls," although in the *Juno* section of the genus, the "standards" become mere horizontal projections, held actually below the "falls." Cf. the plates of *I. alata* (No. XL), *I. bucharica* (No. XLI) and of *I. Warleyensis* (No. XLII).

¹ With the single exception of *I. gracilipes*, *I. sisyrinchium* is the only *Iris* with a monophyllous spathe (see pp. 104, 232). It is moreover the only *Iris* whose rootstock is a corm.

The subdivisions of the genus and its geographical distribution 13

These six segments surround the central style column, which likewise branches into three. Each style branch bears on its under-surface the stigmatic lip, usually near the upper extremity, and above that point splits into two stigmatic crests. The style branches are usually arched and concave on their under-side and so afford protection to the anthers which lie close beneath them. When the style branches curve closely down on to the haft of the falls as in the *Oncocylus* species, a kind of tunnel is formed with the anther lying along the roof and the stigma projecting near the mouth. In theory the visiting insect is supposed to dust its back with pollen as it makes its way down the tunnel towards the nectar in the tube at the base, and then to pollinate the next flower it visits. In practice, however, we find that very few *Pogoniris*¹ become fertilised in this way while in large groups of *Apogon* Irises self-fertilisation is the rule, without the intervention of insects². Bees fail to fertilise the larger *Pogoniris*, partly because the pollen clings so much more firmly to the anthers than does that of the *Apogons*, partly because bees visit flowers of different genera indiscriminately, partly because they often take the shortest path to the nectar by entering the tunnel near its base from the side and not by the main entrance, and partly also because the straight stigma of the *Pogoniris* is so much less prominent than the tongue-like point or points of the *Apogons*.

The ovary of an *Iris* is divided into three longitudinal cells, corresponding to the three style branches, and the placenta forms a central column to which the seeds are attached.

The ovary is usually supported on a pedicel which, however, is sometimes extremely short. Together usually with the tube it is generally encased in the spathes, the valves of which, however, are in some cases so divergent as to expose both tube and ovary.

The subdivisions of the genus and its geographical distribution.

Paradoxical as it may seem, it is hardly possible to take a comprehensive view of the whole *Iris* genus without first dividing it into groups or sections.

It would doubtless be most convenient if one single character could be selected as the basis for this classification, such for instance as the length of the perianth tube or the shape of the seeds, or even that of the pollen, but unfortunately the first of these would separate many plants that are obviously closely allied, and the other two, though they are of great help in dividing the genus into groups, are of little assistance in separating the species within the groups.

We are forced, therefore, to divide the genus into groups in accordance with the more obvious external characters and then to arrange the species within the groups on the basis of other and sometimes less obvious characters in which they differ among themselves.

The first and most obvious division of the genus is into bulbous and non-bulbous species, although the essential difference between a bulb and a rhizome seems merely to be that in the former the growth of one year is entirely absorbed and disappears in the process of preparation for the next year's growth, while in the latter the new growths are formed without the absorption of the material of the old.

Whether a bulb developed originally from a rhizome or a rhizome from a bulb, or both independently from a common ancestor are questions not easy to answer, and the answers to them are hardly relevant to our present purpose. It may, however, be noticed here that seedlings of *I. Grant Duffii* (or *I. Aschersoni*), if lifted during the resting period at the end of their first or second year's growth, appear to have formed bulbs with netted coats, which can only with difficulty be distinguished from those of *I. reticulata*. It is only in subsequent years that those remnants of former growth appear, which constitute the rhizome. See also p. 210.

When this primary division into bulbous and non-bulbous species has been made, we cannot progress any further unless we take more than one character into consideration. For an obvious distinction, such as the presence or absence of a beard, will not allow us to distinguish between several well defined subgenera, such as *Pogoniris* and *Regelia*. Moreover, it is somewhat difficult to define what we mean by a beard in an *Iris*, for many of the so-called beardless species have on the blade of the fall a distinct pubescence which under a microscope has all the appearance of a beard. However, the hair-like processes have a structural difference and are unicellular in the *Apogons*, whereas in the *Pogoniris* the hairs are multicellular.

The first subdivision among the rhizomatous Irises will therefore contain those species in which the centre line of the falls remains smooth or is, at least, only covered with a minute pubescence of unicellular processes. It is to these Irises that the name *Apogon*³ is given. They occur over the whole area in which Irises are found at all, that is to say in the Northern Temperate Zone from the Pacific Coast of North America in the west to China and Japan in the east, and from Alaska and Labrador, Siberia and Kamtschatka in the north to Florida and Hongkong in the south.

Besides their wide distribution and the fact that they far outnumber all the other subdivisions, there is another noticeable characteristic of the *Apogon* species, and that is that practically every one can be recognised by its capsule or seeds, so distinct are these in each case. There are within the subdivision certain well defined groups, such as those of which *I. sibirica* and *I. spuria* may be taken

¹ See p. 156.

² See p. 19.

³ From *πώγων* a beard, and the privative prefix *a*.

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as typical, and a number of other species, which can hardly be grouped together at all in the present state of our knowledge.

We come next to those Irises in which the central ridge develops into a raised crest, the top of which is more or less irregular but which does not split up into hair-like threads. (Cf. *I. tectorum*, Plate XXIV.)

To these the name of *Evansia*¹ is applied, and with the exception of the American *I. cristata* and its subspecies *I. lacustris*, all are natives of the Far East and are found between Kulu in the west and Japan in the east. The single American species differs widely from the other *Evansias* in the absence of any produced stem and in its peculiar seeds (see Plate XLVIII, no. 13), and might conceivably be classed by itself.

In Asia Minor, Syria and Persia are found some species of *Iris* to which the name *Oncocylus*² has been given. They are distinguished by their single-flowered stems, by their peculiar seeds (see Plate XLVIII, no. 8) in the possession of which they all agree, and by the fact that a broad strip along the haft of the falls is covered with a diffuse beard.

Further east, with their centre in Bokhara, come a few species differing chiefly from the *Oncocylus* group in having more than one flower in the single head that their stems produce, and a linear instead of a diffuse beard. The standards are also usually bearded, though this character is not constant, and occurs, moreover, irregularly in some *Pogoniris*, e.g. in forms of *I. germanica*, in *I. Reichenbachii*, etc. and in *Oncocylus* species.

To the south of the great Karakoram and Himalayan Ranges, we find another subgenus which may perhaps be not inappropriately called *Pseudoregelias*. They differ from the *Regelias* in having a more compact rhizome, a less conspicuous aril on the seeds and in their habit of producing their flowers when the foliage is only beginning to develop.

One plant, *I. dichotoma*, seems to call for a subgenus to itself, so different is it in every way from all other known species. It has been aptly called *Pardanthopsis*, for its likeness to *Pardanthus* (*Belamcanda*) *chinensis* is unmistakable. It is a native of Manchuria and Northern China.

There now remain of the rhizomatous species only the extensive class of *Pogoniris* or Bearded Irises, which are distributed over Central and Southern Europe and North Africa, through Asia Minor and Persia to China and North-West India. None are known to be indigenous in the New World, though a few may have escaped from cultivation there, e.g. *I. albicans* which was found by Dr Rose of Washington, D.C., growing on the Sierra Madre in Mexico. Owing to the tenacious hold on life possessed by the fleshy rhizomes of *Pogoniris*, the question of their distribution has probably become more complicated than that of any other section of the genus. The fact that *I. germanica atropurpurea* is the commonest semi-cultivated *Iris* in some parts of the south of France and in Khatmandu in Nepal gives some idea of the difficulty of determining its origin and distribution.

Bulbous Irises are divided into two groups according as the bulb in its resting state has or has not attached to its base a number of fleshy, thick unbranched roots (see Plate XL, *I. alata*, where the brown roots are those that remained unbranched through the resting season). Those species, whose bulbs possess these fleshy roots, form the *Juno* subgenus. Those plants, which produce only a simple bulb with none of these roots attached to it, belong to the *Xiphion* subgenus, of which the *reticulata* group is an important subdivision. The *Xiphions* proper, which comprise what are commonly known as the Spanish Irises, have bulbs with thin membranous outer tunics and are confined to Spain and Portugal, North Africa and Sicily with two possible extensions, of *I. xiphium* along the south coast of France to Béziers and of *I. juncea* along the coast-line of Liguria.

The *reticulata* Irises have their headquarters in Asia Minor and Transcaucasia, possibly with two outlying species in Turkestan near Werny (Verni)³.

The *Juno* group is represented all round the Mediterranean except from the Pyrenees to Macedonia. Its members are abundant in Asia Minor, while others occur in Persia and through Afghanistan to the N.W. Indian Frontier.

Two curious Irises still remain, *I. sisyrinchium*, which of itself constitutes the *Gynandriris* section and which has the peculiarity of possessing a corm and not a bulb for its rootstock, and *I. nepalensis* and its subspecies *I. Collettii*, which are perhaps distantly related to the *Juno* group, with which they agree in the possession of thick roots in the resting state. *I. nepalensis* has for its rootstock a kind of plate-like rhizome to which the roots are attached and which produces the growing bud, in the centre of a close covering of the fibrous remains of old decayed leaves (see Fig. 25, p. 185).

I. sisyrinchium is perhaps the most widely distributed of all Irises, for it has spread to the sea near Lisbon in the west and to Kashmir and to Quetta in the east, while *I. nepalensis* ranges only from Simla through the Shan States into Yunnan.

So far as we know at present, no Irises are found wild to the south of the Equator. Many plants occur which closely resemble them except that they possess no perianth tube and have their segments inserted direct on the ovary, so that they are classed as *Moraeas*.

¹ See p. 98.

² See p. 107.

³ The position of *I. Kulpakowskiana* and of *I. Winkleri* in the genus is still somewhat uncertain.

The cultivation of Irises.

Although hints as to the cultivation of the Irises of the various groups will be found in the introductory remarks on each group, and special directions as to individual species among the observations with which the account of each closes, it may be not inadvisable to make here some suggestions as to the cultivation of Irises in general.

Perhaps the most important point of all is that Irises are sun-loving plants. There are some few, such as *I. foetidissima* and certain *Evansia* species (see pp. 51, 98), that will thrive in half shady positions and others such as the common so-called German Irises which will continue to live where they are overshadowed and get little sun. But these latter will produce few flowers and probably dwindle gradually away. It should be remembered that, even though a species may thrive in partial shade in its native home, yet our summers in England are seldom sufficiently hot to ripen rhizomes growing in such a position here.

With regard to soil, the general rule seems to hold good that the Apogon species thrive best in a moist alluvial soil that is rich in humus, while the Pogoniris group do best in heavy limestone soil, provided that the drainage is good and sunshine abundant.

Few Irises enjoy wet conditions in winter, for growth is then inactive, but all appreciate moisture in spring when the flower-stems and foliage are developing rapidly. When the flowers are over, most Irises appreciate a period of rest, which is perhaps best provided by withholding the water supply. This does not apply to some Apogon Irises and the *sibirica* group, especially, is an exception to the rule. Other Irises that do not require a dry resting period are *Kaempferi*, *laevigata*, *setosa*, *versicolor*, *pseudacorus*, and although the large Spuria group is able to dispense with it there is little doubt that the marshy ground, in which they grow in the wild state, is baked dry by the sun long before the summer is over.

In several cases Irises, which in their native homes are bog plants, will not flower under these conditions in England and must be given comparatively dry positions. Thus *I. fulva* and *I. hexagona* come from the swamps of the South-Eastern United States, but they will only flower here when grown in warm and comparatively dry positions.

Nature has provided us with one infallible sign, which will show us whether an Iris is a native of a dry or a wet soil. This will be seen if leaves of *I. pseudacorus* or *I. versicolor* are held up to the light side by side with a leaf of a Pogoniris, for instance, of *I. germanica*. The latter will appear of a uniform green but the former will show a number of minute blackish spots, which on microscopical examination prove to be due to the fact that at these points the vertical channels in the tissue of the leaves are blocked by growths of apparently the same structure as that which surrounds the passages. The increased thickness of the structure at these points produces the appearance of the black spots. In dealing with new plants this character is often of great use and gives us a guide as to the choice of soil and position, for the presence of these minute black spots always denotes a plant that is a native of marshy ground.

Two mistakes are very commonly made in the cultivation of Irises: they are transplanted in late autumn and they are allowed to become overgrown from the height of summer onwards by carpeting or straggling plants. When either of these mistakes is made, the flowers will be few in the following year.

In the first place, autumnal transplantation is harmful to the plant because by that time the main roots have sent out their lateral branchlets which are broken and maimed when torn up and never afterwards take any firm hold of the ground. A little observation will show that the main root-fibres grow down into the ground to their full length unbranched¹. If therefore a rhizome is lifted when the primary roots are not more than an inch or two in length, no harm will be done if it is planted again carefully. It is obviously, however, even better to transplant before the new roots emerge at all from the rhizome and, in order to find them in this stage, the operation must be carried out immediately the flowers are over. The new growths will then develop and mature for the next year without the fatal disturbance of autumnal transplantation.

In the second place, the fact that Iris rhizomes grow on the surface of the ground² seems to show that sunshine is necessary to their welfare. Whatever the precise effect of the sun may be, the fact remains that rhizomes that are smothered under the growth of other plants are apt to remain flowerless in the following year.

Another common garden practice that is detrimental to Irises is that of trimming off the leaves in late summer and autumn. No plant can assimilate the sap that rises through its roots until it has passed through the leaves, and it is therefore obvious that robust, sound rhizomes will not be formed, if the leaves are trimmed off while they are still green. It is only when they turn brown and come away easily at the base that their removal is a benefit to the plant, for they then only serve to harbour moisture and slugs.

¹ See Plate XLVII.

² I have known instances where rhizomes of large Pogoniris that have been accidentally buried under some inches of earth have extended by means of a long narrow stolon-like growth until the surface was reached, when the stolon has expanded again into a thick rhizome.

When it is necessary to pack Irises for a journey of any length, it will be well to remember that the rhizomes are apt to decay if packed loosely in moist wrappings. It is much better to wrap them tightly in some mossy material that is just so dry that no more moisture can be squeezed from it. This wrapping excludes a free circulation of air and prevents entire desiccation. As to seeds, there is only one caution and that is that a small canvass bag or packet, with a label attached for the stamp and address, is far safer than an envelope in which the seeds are often crushed by stamping in the post.

Rhizomes that arrive much parched after a long journey are perhaps best treated by being plunged in old cocoanut fibre in a cold frame or in some sheltered position. With such treatment, it is not long before the new roots begin to push out. The rhizomes should be frequently inspected, for the roots grow apace when once they start. When a few roots have made their appearance, it is advisable to place the rhizomes at once in their permanent position, so that the fibres may grow there to their full length and not be broken by transplantation at a later date.

Iris diseases and their remedies.

Pseudomonas iridis or Iris root rot. Cf. Journ. R. H. S. xxviii. p. 662 (1904).

Of late years this disease has been very common among Pogoniris in some gardens. It is generally at its worst during the flowering season, when tufts of leaves will be found turning prematurely yellow at the tips or stems will be discovered rotten at the base. The disease is bacterial. The rhizomes become rapidly soft and rotten, and emit an offensive smell.

When a plant is found attacked, it should be lifted without delay. The soft portions of the rhizome should be carefully cut away and burnt, and the sound remainder, including the roots and leaves, dipped into a bright pink solution of potassium permanganate or Condy's Fluid.

The Iris should then be replanted, if possible in a fresh position, in soil that has received a dressing of superphosphate of lime or of some other acid manure. An acid medium is fatal to the bacteria, which thrive in lime and alkaloids. Unless the ordinary garden soil is strongly impregnated with lime, the amount of superphosphate used should not exceed 1 lb. to 5 square yards.

Myrothecium adustum Masee, Gard. Chron. 1899, 1. p. 412, and Plant Diseases, p. 325 (1903).

This is the disease which sometimes attacks *Iris reticulata*, and carries off the bulbs by hundreds. For this reason, it is advisable to lift the bulbs of the *reticulata* group at least every other year. If the disease is present, traces of it will then be found in the shape of black patches on the outer netted coats of the bulbs. Any that are badly diseased should be burnt and the rest soaked for two hours in a solution of formalin of the strength of one part in three hundred of water. The bulbs should then be dried and stored in a warm dry place until they are replanted.

Puccinia Iridis DC. (Iris Brand or Rust). *Cooke, Fungoid Pests, p. 74. Pl. v. fig. 91 (1906).

This produces crowded patches of rusty-brown pustules on the leaves, and although a slight attack appears to do little harm to the plants, yet it may become so severe as to destroy the leaves entirely and thus greatly weaken the plants. Spraying at intervals of about 3 days with a solution of 1 oz. of sulphide of potassium (liver of sulphur) to 2—3 gallons of water seems to check the spread of this disease. Leaves badly affected should be collected and burnt.

Heterosporium gracile Wallr., Gard. Chron. 1894, 1. p. 718; *Cooke, Fungoid Pests, p. 75. Pl. v. fig. 90 (1906).

This usually appears in late summer and autumn on the leaves of Pogoniris in the form of elliptical pale-brown spots with a darker margin. The foliage should be sprayed with ammoniacal copper carbonate solution. This is made by mixing together three ounces of sulphate of copper and three ounces of sodium carbonate with one quart of the strongest concentrated ammonia. When wanted for use the resulting blue liquid should be diluted with twenty-two gallons of water. This disease seems to break out much more readily among Pogoniris species when the soil is deficient in lime.

Where any large collection of Irises is grown together, it may be found advantageous to spray the plants in spring and early summer at intervals of about a month with some disinfectant, such as formalin, potassium permanganate or the Aseptic Spray solution supplied by R. E. Evans, Horticultural Chemist, Stratford-on-Avon. This precaution tends to prevent outbreaks of the above-mentioned diseases.

ANALYTICAL KEY

TO THE SUBDIVISIONS OF THE GENUS IRIS.

N.B. A Key to the species in each subdivision will be found at the pages indicated

- | | | | |
|-----|---|---|--|
| 1. | <ul style="list-style-type: none"> Rootstock bulbous. Rootstock non-bulbous. | 1.
3. | |
| 1. | <ul style="list-style-type: none"> Rootstock a simple bulb without persistent roots. Rootstock a bulb with fleshy roots persistent in the resting season. | 2.
The <i>Juno</i> Section
(see p. 187). | |
| 2. | <ul style="list-style-type: none"> Rootstock a bulb with smooth, membranous outer coats. Rootstock a bulb with netted outer coats. | The <i>Niphium</i> Section
(see p. 210).
The <i>Reticulata</i> Section
(see p. 220). | |
| 3. | <ul style="list-style-type: none"> Rootstock a corm with shaggy, netted coats. Rootstock neither a bulb nor a corm. | The <i>Gynandriris</i> Section
(see p. 229).
4. | |
| 4. | <ul style="list-style-type: none"> Rootstock a minute flattened rhizome, hardly more than a growing point, surrounded by a thick mass of fibres and having a number of fleshy persistent roots attached to its base. Rootstock a rhizome. | The <i>Nepalensis</i> Section
(see p. 184).
5. | |
| 5. | <ul style="list-style-type: none"> Outer segments (falls) crested. Outer segments (falls) not crested. | The <i>Evansia</i> Section
(see p. 98).
6. | |
| 6. | <ul style="list-style-type: none"> Outer segments (falls) bearded with multicellular hairs. Outer segments (falls) unbearded or with a pubescence of unicellular hairs. | 7.
10. | |
| 7. | <ul style="list-style-type: none"> Seeds with a conspicuous, creamy-white, circular aril. Seeds without any conspicuous aril. | 8.
The <i>Pogoniris</i> Section
(see p. 135). | |
| 8. | <ul style="list-style-type: none"> Aril conspicuous, often nearly as large as the seed itself, flowers not appearing until the leaves are practically full grown. Aril not so conspicuous, much smaller than the seed; flowers appearing when the leaves are still quite short. | 9.
The <i>Pseudoregelia</i> Section
(see p. 129). | |
| 9. | <ul style="list-style-type: none"> Stem 1-headed, 1-flowered. Stem 1-headed, 2—3-flowered. | The <i>Oncocyclus</i> Section
(see p. 107)
The <i>Regelia</i> Section
(see p. 123). | |
| 10. | <ul style="list-style-type: none"> Inflorescence a regular raceme, seeds conspicuously winged (cf. Plate XLVIII, no. 11); flowers fugitive and twisting spirally as they wither. Inflorescence not a regular raceme, seeds not conspicuously winged. | The <i>Pardanthopsis</i> Section
(see p. 96).
The <i>Apogon</i> Section
(see p. 18). | |

THE APOGON SECTION

This section of the *Iris* genus has already been defined at p. 13 as containing all those species of rhizomatous Irises, in which the central line of the falls is either smooth or only covered with a pubescence of unicellular processes.

It seems, unfortunately, impossible to select any one character or set of characters to form a guide through the maze of species. The nearest approach to such a character is found in the seeds, but, besides the fact that these are often missing in herbarium specimens, those of a few species, such as *Bungei* and *Rossi*, are still undescribed. Moreover, the seeds of the species in each group are readily distinguishable and have only a certain family likeness, which indeed in some cases is only apparent to the practised eye.

The classification of the Apogon species given below is therefore admittedly unsatisfactory, partly for the reasons already given, and partly also because some of the species seem to stand by themselves and to have little affinity to any others. Under each heading in the following list an attempt is made to give the chief characteristics of the species included.

I. *The sibirica group* has seven representatives in Eastern Asia, one in Europe and one in America. Stems hollow (except in *I. Clarkei* and *I. prismatica*); capsule trigonal; seeds disc-shaped, D-shaped, or cubical; leaves thin and grassy; perianth tube short, not smooth but obviously formed of the concretion of the bases of the segments. Stigma a projecting triangular tongue. See p. 19.

II. *The tenuifolia group*. This group of Central Asiatic Irises consists of plants with short unbranched stems, and rigid, linear leaves. The growths are very crowded and the bases of the leaves seem to persist for several years, and form dense bundles which in the wild state have the appearance of being either burnt or browsed off. The root fibres are very wiry. [N.B. *I. songarica* seems to be a connecting link between this group and the *spuria* group.] See p. 32.

III. *The Californian group*. Rhizomes slender, root-fibres few in number. Leaves tough and leathery, scanty, pink at the base. Seeds light brown or buff, spherical, thick D-shaped or even almost cubical. The dying leaves turn a dull red, quite distinct from the usual brown colour of withering Iris foliage. See p. 35.

IV. *The Syrian group*. Rhizome annulate and surrounded with stiff bristles. Spathes very long and narrow, one flowered with the pedicel equal in length to the spathe. See p. 45.

V. *The Chinese group* consists of four species of slender growth, of which apparently only one is in cultivation. *I. minuta* and *I. Henryi* are probably allied to one another. The other two are grouped with them by reason of their geographical proximity and not of any known structural affinity. See p. 46.

VI. *The scarlet-seeded Iris*. The single character of the scarlet seeds, that remain attached to the open capsule, seems sufficient to separate *I. foetidissima* from all other species. Confined to Europe and North Africa. See p. 50.

VII. *I. ruthenica* with its dwarf grassy growth and prominent white excrescence on the fresh seeds seems also to stand entirely alone. This species is found in Hungary, in the Altai region, and thence eastwards as far as Peking. See p. 52.

VIII. *I. unguicularis* is distinguished by its tough foliage, close-matted growth, long perianth tube and undeveloped stem, and also by the curious and characteristic processes that cover the upper surface of the style branches. See p. 54.

The type is found in Algeria but subspecies also occur in Greece, Crete and Asia Minor, as far east as Alexandretta and Lazistan. See p. 56.

IX. *The spuria group*. The chief characteristics of this group are the double ribs at the angles of the capsules, the loose parchment-like skins of the seeds, the two-toothed stigma, and the panduriform outer segments. Leaves ensiform, tough, emitting a slightly fetid odour when bruised. Its representatives are widely distributed through Europe and Asia as far east as Kashmir. See p. 57.

X. *The laevigata group*. Seeds more or less D-shaped, with smooth polished skins. This group is represented in Eastern America, Europe and Eastern Asia. See p. 72.

XI. *The hexagona group*. Capsules with six ribs, more evenly distributed on the circumference than in the *spuria* group; flowers set in the axils of the leaves. Confined to the Eastern United States. See p. 81.

XII. *Iris ensata*. Ovary six-grooved, passing almost imperceptibly into the pedicel, tube very short. Capsule long, narrow, almost spherical in section, with six ribs at equal intervals. Seeds smooth, pyriform, or slightly compressed. Leaves narrow, linear-ensiform. An Asiatic species. See p. 85.

XIII. *The longipetala group*. The plants resemble *I. ensata* in the characters of the rootstock and foliage. The seeds are somewhat similar, but distinctly larger and not compressed. The capsules are broad at the centre and taper at either end. The group is confined to the Rocky Mountains and to the region lying between that range and the Pacific. See p. 89.

XIV. *The tripetalous group*. The inner perianth segments or standards are reduced to little more than bristles. The members of the group are found in Eastern Asia, Alaska and along the east coast of North America. See p. 92.

XV. *Iris verna* an anomalous species, with the habit of a Pogoniris but beardless. See p. 95.

1. The Sibirica Group.

This group of ornamental Irises consists of about nine species, all of which with the single exception of *I. prismatica* are natives of Europe or Asia. It is only within comparatively recent years that the group has been more than doubled in size by the addition of five new species from Western China, namely *I. Delavayi*, *I. Wilsoni*, *I. Forrestii*, *I. Bulleyana*, and *I. chrysographes*. Of the older species, *I. Clarkei* was discovered near Darjeeling by Sir Joseph Hooker rather more than sixty years ago, *I. orientalis* was described by Thunberg at the end of the eighteenth century, and *I. sibirica* was known to Clusius. The one American representative, *I. prismatica*, was first described by Pursh early in the nineteenth century.

All the species agree in the possession of grassy leaves, produced in close tufts from the slender, much branched rhizomes. In all cases the root system is composed of masses of close-growing fibres, which are indicative of moisture loving Irises. Moreover, a hollow stem is found in seven of the nine species but nowhere else in the genus. Herbarium specimens are seldom a safe guide on this point, for the pith in the centre of a stem often shrivels and this leaves a hollow, although the living stem is solid.

All the members of the group do best in soil that is rich in humus, for this tends to maintain a certain degree of moisture in the soil. For some reason, *I. Delavayi* seems to be perhaps the most exacting in this respect, for it obstinately refuses to flower unless abundantly supplied with moisture during the growing season. *I. Clarkei*, too, is scarcely easy to maintain in health. It grows in wet ground in the Himalayas in the neighbourhood of Darjeeling and seems to resent any attempt to cultivate it in too dry and hot a soil. In dry sandy soil, seedlings do well for a year or two and then usually succumb.

I. sibirica and its allies all agree in the possession of a tongue-like stigma, which enables them to be independent of insects for fertilisation. In some cases the anthers actually reach the reflexed tongue of the stigma, while in others this tongue is able to gather the pollen that has fallen from the anthers on to the haft of the falls. In all cases the pollen is extremely easily shaken from the anthers, and it is indeed often difficult to extract an anther without losing most of the pollen.

Seeds are accordingly easily obtained and, except perhaps in the case of *I. Clarkei*, germinate readily in spring, if sown in September or October and left in the open during the winter. When the young seedlings have produced four or five leaves, they should be planted out in their permanent quarters, where a fair proportion of them may be expected to flower in the following season.

When transplantation of mature plants is necessary, it should be carried out in late summer or early autumn, before the young roots, which push out freely after the flowering season, have grown to any length. Unless it is desired to perpetuate any particular form, it is hardly worth while to divide clumps of these Irises since seedlings are so easily raised and usually produce a much better effect if allowed to grow undisturbed where they were originally planted out. It is not uncommon for plants to produce as many as ten or twelve flower stems, when they flower for the first time.

The species that form the group may be differentiated as follows:—

{	Stem hollow.	1.
	Stem solid.	7.
1.	{ Inner segments (standards) erect.	2.
	{ Inner segments (standards) extended obliquely.	4.
2.	{ Leaves glaucous on both surfaces.	3.
	{ Leaves glossy on the upper surface and glaucous beneath.	<i>I. Forrestii</i> (p. 27).

3. { Pedicels of unequal length, some very long; seeds thin flat D-shaped; capsules short, globose. *I. sibirica* (p. 20).
 { Pedicels more nearly equal and shorter; seeds thick, cubical; capsules longer, trigonal. *I. orientalis* (p. 23).
4. { Foliage with glossy upper surface, glaucous beneath; seeds small, thick discs or D-shaped. *I. Bulleyana* (p. 30).
 { Foliage glaucous on both surfaces. 5.
5. { Stems much longer than the leaves; seeds flat discs. *I. Delavayi* (p. 25).
 { Stems about equal to the leaves. 6.
6. { Perianth tube short, pedicels very long; seeds small, cubical. *I. Wilsoni* (p. 26).
 { Perianth tube longer, pedicels shorter; seeds pyriform, more or less compressed. *I. chrysographus* (p. 28).
7. { Stem stout, straight; leaves with a glossy upper surface; seeds disc-shaped, with wrinkled thickened flange, capsule trigonal. *I. Clarkei* (p. 29).
 { Stem slender, wiry, curiously bent; leaves glaucous on both surfaces; seeds pyriform, compressed with smooth skins and no flange; capsule acutely winged. *I. prismatica* (p. 31).

†‡ *I. SIBIRICA*

(PLATE I a)

Linn. Spec. Plant. ed. 1 p. 39 (1753).

• Jacq. Fl. Aust. 1. t. 3 (1773).

• Bot. Mag. t. 50 (1788), t. 1163 (1809) var. alba.

• Red. Lil. VII. t. 420 (1813), VIII. t. 438 (1816) (both var. alba; two forms).

Koch, Syn. ed. II. p. 810 (1844).

• Reichb. Icones, CCCXLI. fig. 768 (1847).

Hausmann, Fl. von Tirol, II. p. 861 (1852).

Ambrosi, Fl. Tir. mer. 1. p. 646 (1854).

Parlatore, Fl. it. III. p. 300 (1858).

Baker in J. L. S. XVI. p. 139 (1877).

Hdk. Irid. p. 9 (1892).

Nyman, Consp. p. 702 (1878), Suppl. p. 295 (1890).

Boiss. Fl. Or. v. p. 126 (1881).

Richter, Pl. Eur. 1. p. 256 (1890).

Marchesetti, Fl. Triest, p. 540 (1896-7).

Lynch, Book of the Iris, p. 70 (1904).

Asch. und Graeb. Syn. III. p. 505 (1906).

SYNONYMS.

I. maritima, Miller, Dict. ed. VIII. no. 11 (1768).

• Reichb. Icones CCCXLII. fig. 769 (1847).

I. flexuosa, Murr. Nov. Comm. Gott. VII. p. 30, t. 4 (1776).

I. pratensis, Lam. Fl. Fr. III. p. 498 (1778).

Lam. Encycl. III. p. 300 (1789).

I. angustifolia, Gilib. Exercit. Bot. II. p. 498 (1792).

Miller, Dict. ed. VIII. no. 12 (1768).

I. stricta, Moench, Meth. p. 528 (1794).

I. acuta, Willd. Enum. Hort. Berol. Suppl. p. 4 (1813).

• Reichb. Icones CCCXLIII. fig. 770 (1847).

I. trigonocarpa, A. Braun, K. Koch and Bouché, Ind. Sem. Hort. Berol. 1853, p. 17.

(The specimen of this in Herb. Braun (B) shows that there was some confusion between *I. prismatica* Pursh, and a small form of *I. sibirica*, for parts of both plants occur together on the same sheet.)

I. erirrhitza, Pospich, Fl. Oest. Küstenl. 1. p. 269 (1897).

Xiphium sibiricum, Schrank, Flora VII. (1824), 2 Beibl. p. 17.

Parlat. Fl. It. III. p. 300 (1858).

Xiphium flexuosum, Alef. BZ. XXI. p. 297 (1863).

Xyridion flexuosum, Klatt, BZ. XXX. p. 500 (1872).

Xyridion sibiricum, Klatt, BZ. XXX. p. 500 (1872).

† Indicates that the species has grown and flowered in my garden.

‡ Indicates species that I have raised from seed.

• Indicates that the species is illustrated.



DISTRIBUTION. Central Europe and Russia.

France St Symphorien (Char. Inf. (sic)? Gironde); Landes de Cadeuil, 1903, Neyrant (E).

Germany. Brandenburg: Rudower Wiesen, 1854— (B).

Nauen: Bredower Forst, 1886, Scheppig (B).

Copenick, 1893, Diels.

1900, Schulz (E).

Brunswick: Blankenburg a. H. 1848, Bauer (B).

Anhalt: Bernburg, 18—, — (BM).

Silesia: Lissa near Breslau, 1881, Engler (B).

Pomerania: Bromberg, 18—, Kuhling (B).

Saxony: Nasse Aue near Dresden, 18—, Rchb. f. (B) (BM).

Meissen, 1852, Rchb. f. (B).

Dresden, 1846, Gansauge (B).

Stassfurth, 18—, Coschke (BM).

Rheinland: Beuel near Bonn, 1851, Blackie (E).

Thuringia: Eckardtsberga, 1884, Gottschalk (B).

Waldau near Osterfeld, 1880, Schliesshacke (B).

Between Forst and Friedelsheim, 1848, Koch (B) (O).

1852, Billot (BM).

1852, Koch (C).

Alsace: Benfeld, 1863, Nickles (B) (BM).

1863, Koch (K).

Hesse: Bingen, 1869, Winter (V).

Palatinate: Dürkheim near Kaiserslautern, 1817, Koch (K).

Frankenthal near Forst, 1845, Schultz (K).

Bavaria. Regensburg (Ratisbon), 18—, Martins (BM).

18—, Binder (V).

18—, Hoppe (B).

Dachauer Moos, 18—, Spitzel (V).

Austria. Windischgarsten, 1865, Oberleitner (BM) (K).

Wiener Neustadt, 1869, Sonklar (E).

Salzburg: Salzburg, 1807, Steinack (B).

Aigen, 18—, Stohl (B) (BM).

Stiria: Mooskirchen, 18—, Dominicus (B) (BM).

Admont, 1907, Glatz and Strobl (B) (BM) (E) (V).

Tirol: Rattenburg, 1887, Woynar (B).

Carniolia: Dornegg in Reka Valley, 18—, Paulin (BM).

Switzerland. Zurich, 1849, Nageli (B), 1837 (E).

1873, Jaggi (K).

Belp, 18—, Hb. Otta (B).

1838, Shuttleworth (C).

Lake of Joux, 1836, Muret (K).

Bâle, 1830, Hb. Shuttleworth (BM).

Schaffhausen, 1864, Assmann (C).

Lugano, 1834, Thomas (K).

Italy. Venice (Treviso), 1904 Pampanini (K) (O) (E).

St Marcel and Aosta, 1822, Thomas (K).

Russia. Dorpat (Jurjew), 1862, Gruner (BM).

Lithuania; Korzenicw (Distr. Pinsk), 1893, Twardowska (V) (BM).

Wilna, 18—, Gortki (V).

Perm; River Kama near Sludskoje, 1898, Sjuzew (V).

Moscow, Ruposowo—Czerkizowo, 1898, Syrejszikow (V).

St Petersburg; River Luga near Preobrashenskaja, 1898, Mazaraky (E).

Servia. Gornje—Milanovatz, 1896, Adamovic (V).

Diagnosis.

I. sibirica Apogon; *rhizoma* gracile, dense caespitosum, *folia* utrinque glaucescentia, *caulis* fistulosus, *foliis* longior; *spathae* multiflorae; *pedicelli* longi, inaequales; *capsula* brevis, rotundata, lateribus valde convexis; *semina* magna, tenuia, compressa, suborbicularia.

Description.

Rootstock, a short-creeping and closely tufted rhizome, with fibrous remains of old leaves attached.

Leaves, linear, slightly glaucous, not rigid, slightly tinged with pink at the ground level, $\frac{1}{4}$ — $\frac{1}{3}$ in. by 12—24 in.

Stem, hollow, much overtopping the leaves, bearing a terminal head of 2—5 flowers and usually a lateral head, a short distance below. Cf. Plate I.

Spathes, small, narrow, acute, entirely brown scarious at flowering time.

Pedicels, from $\frac{1}{2}$ —3 in. long, increasing in length with the successive flowers.

Ovary, trigonal.

Tube, $\frac{1}{2}$ in. circular, with many indistinct ribs.

Falls. The orbicular blade narrows abruptly to the much veined haft, which bears two projecting flanges near the base¹. The colouring is produced by blue-purple veins on a white ground, which is entirely obscured on the outer part of the blade. Varieties with grey- or lavender-white flowers are common.

Standards, shorter than the falls, broadly lanceolate with slightly canaliculate haft, either blue-purple or white.

Styles, shorter than the standards, bluntly keeled.

Crests, small, subquadrate or deltoid, with serrate edge, overlapping.

Stigma, a triangular, tongue-like projection.

Filaments, purplish or white.

Anthers, deep blue or cream.

Pollen, bluish or cream.

Capsule, oblong, scarcely twice as long as broad, trigonal with bulging sides, not beaked.

Cf. Fig. 2 a, p. 23.

Seeds, large, thin, flat D-shaped.

Observations.

Linnaeus defines this plant by referring to Gmelin, *Flora Sibir.* 1. p. 28 (1747), who speaks of it as a hollow-stemmed Iris, received from Siberia. Linnaeus also quotes from C. Bauhin's *Pinax*, p. 32, the description of an *I. pratensis*, whose narrow leaves have not the slightly fetid smell of those of *I. spuria*. (The latter was also classed by Bauhin under the name of *I. pratensis*.) Bauhin in turn quotes Clusius' *History of Pannonian Plants* (p. 252). The latter's description is as usual that of an acute observer of the living plant, whose habitat is given as Austria. He notes the short capsules, which turn almost black with age and open slightly at the apex. This exactly describes the capsules of *I. sibirica* as we now know it.

This Iris must be carefully distinguished from the Eastern *I. orientalis* of Thunberg, which seems to deserve specific rank. The two plants are very different in appearance, though the flowers are very similar (see Plate I). In the European species the flowers are raised well above the foliage, sometimes to a height of 3—4 feet, while in the Oriental plant the stem is shorter than the leaves. Moreover in the former a side shoot is common below the terminal head, which contains 3 or even 5 flowers on pedicels of varying lengths up to 3 inches. *I. orientalis*, on the other hand, rarely has more than the single terminal head of two flowers and the pedicels are shorter. The capsule is long, angular and narrow instead of short, rounded and comparatively broad as in *I. sibirica* (cf. Fig. 2). The seeds of the latter are flat and large, somewhat D-shaped, while those of *I. orientalis* are smaller, thicker and indeed almost cubical.

Although it is easy to distinguish the typical European plant from that which is here described as *I. orientalis* and which, moreover, certainly breeds true from seed, it is by no means so easy to define the distribution of the two plants. Herbarium specimens alone are extremely unconvincing, for the capsules and seeds are usually wanting and it is in these that the real difference lies. Without them, it is impossible to say whether the Far Eastern forms from Manchuria and Corea should really be classed as *I. sibirica* or *I. orientalis*. To add to the difficulty, I have never yet been able to obtain either plants or seeds of any form from Eastern Asia on the authenticity of which I could absolutely rely. It is, however, true that seeds, which I have received as being those of Corean plants, have been of the small cubical type, characteristic of *I. orientalis*. It is true, too, that all the herbarium specimens from the Far East have stems that are barely, if at all, longer than the leaves, a point in which they resemble *I. orientalis*. Of the spathes it is impossible to speak with certainty, for it is difficult to say whether a dried spathe of *I. sibirica* or *I. orientalis* was scarious or herbaceous when it was alive².

If we accept the theory that *I. sibirica* is confined to Europe, the question arises as to how the name *sibirica* came to be applied to a European plant. An answer to this question is that the Far Eastern plant was probably confused with the European specimens. Pallas' specimens (BM) show that it was known in Europe in the latter half of the eighteenth century. Linnaeus, as usual, took the name from another author, Gmelin, and did not base it on first hand knowledge.

Of *I. sibirica* many garden forms are known, which may or may not be peculiar to definite localities, for differences of soil easily account for differences in the length and breadth of the stem and leaves. Such forms, therefore, as *acuta*, a dwarf plant with narrow foliage, scarcely deserve to be distinguished by name. Still less right has the name *flexuosa* to be recognised, for it only represents

¹ These show more clearly in the drawings of *I. orientalis*, *I. Wilsoni*, *I. Forrestii* and *I. chrysographes*, Plates I—IV, than in that of *I. sibirica*.

² At the same time, we must not lose sight of the fact that it is by no means impossible that *I. sibirica* and *I. orientalis* are not really two distinct species but merely different combinations of certain pairs of Mendelian characters, such for instance as the flat or cubical shape of the seeds. If we were to accept this hypothesis, we should not be able to deny that there might possibly exist in Eastern Asia plants with the spathes and inflorescence of *I. sibirica* and with the capsule, seeds and relative length of stem of *I. orientalis*.



a white flowered form, differing from blue forms merely in the absence of the colour¹. The supposed variety *trigonocarpa* (see Synonymy) is based on the characters of the capsule of *I. prismatica* Pursh, with which a small form of *I. sibirica* was confused, while the *I. triflora* Balbis, which Ascherson and Graebner make into another variety (see Syn. pp. 506-7), is shown by its ovary to be a variety of *I. ensata* Thunb. In fact, until plants can be obtained from various localities and grown side by side under similar conditions of soil and climate, we can only leave unsettled the question of the existence of distinct local forms.

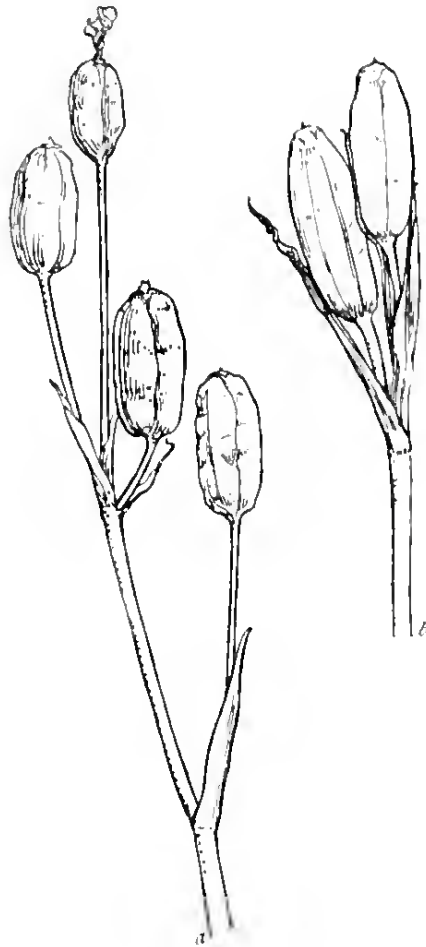


FIG. 2. Ripe capsules of (a) *I. sibirica*, (b) *I. orientalis*.

I. sibirica has been fertilised with pollen of *I. Delavayi* and the cross produced a tall sterile hybrid, distinguished from *I. sibirica* by little else than its great height (5-6 feet) and the slightly more prominent white markings on the blade of the fall. *I. sibirica* will also hybridise with *I. Clarkei* and the resulting plants are intermediate between the parents.

There are also in cultivation crosses between *I. sibirica* and *I. orientalis*, providing a series of forms intermediate between these two species.

For cultivation, propagation, etc., see p. 19.

†† *I. ORIENTALIS*

(PLATE 16)²

Thunberg in Trans. Linn. Soc. II. p. 328 (1794), non Miller.

Somoku Zusetsu, II. 5 (unnamed). (The Japanese name is Ayame.)

SYNONYMS.

I. sibirica, Thunb. Fl. Jap. p. 33 (1784).

I. sanguinea, Donn, Hort. Cant. ed. VI. p. 17 (1811).

I. sibirica var. *sanguinea*, Ker in Bot. Mag. t. 1604 (1813).

I. Nertschinskia, Lodd. Bot. Cab. t. 1843 (1832-3).

I. haematophylla, Fisch. in Sweet, Brit. Fl. Gdn. t. 118 (1825) non Link.

I. sibirica var. *orientalis*, Baker, Hdk. Irid. p. 9 (1892).

Xiphium orientale, Schrank, Flora VII. 2 Beibl. p. 19 (1824).

¹ The fact that the white forms breed true in colour when self-fertilised tends to show that the absence of colour acts as a Mendelian recessive character.

² Only the flower of *I. orientalis* is represented in the plate. The plant sketched behind it is *I. sibirica* and the sketch is intended to show the relative length of stem and leaves in that plant.

DISTRIBUTION. Manchuria, Corea and Japan.

Pallas' specimens (BM) seem undoubtedly to be the Asiatic plant but bear no date or locality.

- Manchuria*. River Suifun, 17—, Guldenstadt (BM).
 Lake Hanka, 1898-9, Bohnhof (K) (P).
 Mukden to Kirin, 1886, James (K).
 River Amur, 18—, Maximowicz (K).
 Nertschinsk, 1889, Freyn (K).
 Sachalin, 1905, Karo (K).
 R. Amur near Radde and Baschurova, 1895, Komarov (BM).
Corra. Seoul, 1892, Veitch (K).
 Ouen-san, 1906, Faurie (L).
 Tban-jen, 1897, Komarov (K).
 No locality, 1884, Carles, No. 36 (BM).
Tshu-shima Island. 1859, Wilford (K) (V).
Japan. Nippon; Haraki, 1900, Faurie (B).
 Nikko, 1903, Uno (BM).
 1904, Takeda (K).
 Higo san, 1863, Maximowicz (BM).
 Nagasaki, 1863, Maximowicz (BM) (K).
 Tokyo (Musashi), 1908, Yokohama Nursery Co. (E).
 Yezo; Ochiai Mts. 1904, Faurie (B).
 Shibetscha, 1890, Faurie, No. 5500 (K).
 Akkeshi to Shibetscha, 1889, Faurie, No. 4997 (K).
 Hakodate, 1890, Faurie, No. 6286 (K).
 No locality, 18—, Buerger (K).
 187—, Maries (K).

Diagnosis.

I. orientalis Apogon; *I. sibirica* similis sed *caulis* foliis subaequilongus; *spathae* biflorae nec multiflorae; *pedicelli* breves; *capsula* multo longior, oblonga; *semina* parva, crassa.

Description.

Rootstock, a short-creeping and closely tufted rhizome, with fibrous remains of old leaves attached.

Leaves, linear, slightly glaucous, often much tinged with red-purple at the base, not rigid, $\frac{1}{3}$ — $\frac{1}{2}$ in. by 18 in.

Stem, hollow, equal to or slightly shorter than the leaves, bearing a terminal head of 2—3 flowers and sometimes (but rarely) a lateral head.

Spathes, broad, lanceolate, only slightly scarious at flowering time, often of a vivid red-purple colour, 2-flowered.

Pedicel, $\frac{1}{2}$ —1 in.

Ovary, trigonal, with a slight ridge down each face.

Tube, $\frac{1}{2}$ circular, with many indistinct ribs.

Falls. The suborbicular blade narrows abruptly to the short haft, which bears two projecting flanges near the base¹. The colouring is produced by blue-purple veins on a white ground, which is entirely obscured on the outer parts of the blade. The albino variety is milk-white with faint yellow veinings on the haft.

Standards. Broadly oval with a short canaliculate haft, erect and curving together at the apex; slightly shorter than the falls; either blue-purple or white.

Styles, shorter than the standards, bluntly keeled, much wider in the upper part than at the base.

Crests, small, subquadrate, with serrate edge, overlapping.

Stigma, a triangular, tongue-like projection.

Filaments, purplish or white.

Anthers, deep blue or cream.

Pollen, bluish or cream.

Capsule, oblong, about three times as long as broad, trigonal, with flat sides, not beaked. See Fig. 2 b, p. 23.

Seeds. Small, comparatively thick and almost cubical.

Observations.

The relationship of this plant to *I. sibirica* has already been discussed at some length under the observations on *I. sibirica* (see p. 22). It is impossible at present to decide whether it should be looked upon as a distinct species or merely as a different combination of Mendelian characters.

It is doubtful whether the form of *I. orientalis*, of which a flower is illustrated on Plate I and which is often imported from Japan, is really a wild form or whether it may not be the result of horticultural breeding and selection in Japan, for the larger herbarium specimens seem all to come from the neighbourhood of the more thickly populated districts. On the other hand, *I. sibirica* and *I. orientalis* vary considerably in the vigour of their growth and in the size of their flowers according to the nature of the soil in which they are grown and to the character of the particular season.

¹ See Plate I.



It is therefore not impossible that the small herbarium specimens really represent plants, which under more favourable conditions of growth, would develop to the size and vigour of that illustrated. When *I. orientalis* is grown in poor conditions of soil, it approximates to *I. sibirica* in size and growth and for this reason it is impossible to decide, in the absence of capsules and seeds, whether the Eastern Asiatic plant is really *I. orientalis* or *I. sibirica*. They are here classed as *I. orientalis* and, if this is a mistake, it is at least curious that *I. sibirica* should be found nowhere between European Russia and the neighbourhood of Nertschinsk.

Whatever the truth may be, the fact remains that as garden plants typical *I. sibirica* and *I. orientalis* are very different. *I. orientalis* with its flowers partly hidden among the leaves or at most only slightly raised above them is scarcely as ornamental a plant as *I. sibirica*. By hybridisation, plants intermediate between these two extremes can easily be obtained and the best garden plants are probably those that combine the growth and inflorescence of *I. sibirica* with the larger and more brilliant flowers of *I. orientalis*.

As in the case of *I. sibirica*, several garden forms with white flowers are known. One is usually called Snow Queen, but in my experience it is less vigorous and floriferous than a plant which Japanese nurserymen supply as *I. lucvigata alba*.

Self-fertilised seeds of the white forms come true to the white colour and we may therefore look upon the absence of colour as a Mendelian recessive character.

This *I. orientalis* of Thunberg must be carefully distinguished from the *I. orientalis* of Miller by which was probably meant *I. ochroleuca*, a relative of *I. spuria* (see p. 63). Miller's name is based on a confusion between a *Pogoniris* and an *Apogon* and cannot therefore stand.

For the cultivation, propagation, etc. of *I. orientalis* see p. 19.

†*I. DELAVAYI*

*Micheli in Revue horticole, p. 398, figs. 128, 129 (1895).

*Bot. Mag. t. 7661 (1899).

DISTRIBUTION. Swampy ground in South-western China.

Tatsienlu (9500—13,500 ft.), 1890, Pratt, no. 247 (K) (E).

1891, Soulié (P).

1903, Wilson, no. 4555 (K).

Washan (W. Szechuan, 5—8000 ft.), 1908, Wilson, no. 3071 (K).

Diagnosis.

I. Delavayi Apogon; *I. sibiricae* similis sed *capsula* oblonga, longissima; *semina* compressa, sub-orbicularia, marginibus pallidis; *flores* purpurei nec coerulei.

Description.

Rootstock, a creeping rhizome, less closely tufted, perhaps, than that of *I. sibirica*, but similarly clothed in fibrous remains of old leaves.

Leaves, about 2—2½ feet long, by ½—1 in. broad, linear acuminate, glaucescent on both surfaces.

Stem, 3—4 feet, hollow, bearing a reduced leaf and one or two lateral heads besides the terminal.

Spathe valves, 3—4 inches long, keeled, the outer being usually distinctly longer than the inner, 2-flowered, slightly scarious at tip only.

Pedicel, 1½—3 in., triangular in section.

Ovary, sharply trigonal, sides concave without a median ridge.

Tube, ½ in., formed of the concretion of the green falls and deep violet purple standards.

Falls. The haft, which bears near the base two whitish, purple-spotted buttresses is of a greenish-white, spotted and mottled with purple-violet except along the greenish median ridge. The blade is emarginate, orbicular or rounded oval, of a deep violet-purple with white markings and a conspicuous white patch at the bend.

Standards. The small lanceolate emarginate blade is held at an angle of 45° by the canaliculate haft, deep violet.

Styles, broad, above an inch long.

Crests, small, quadrate and overlapping.

Stigma, a tongue-shaped appendage.

Filaments, cream.

Anthers, mauve.

Pollen, cream.

Capsule, narrowly oblong, sharply trigonal, tapering equally, but somewhat abruptly, at either end, a distinct furrow runs down each side, so that the section is almost trefoil, often as much as 2—2½ in. long.

Seeds, flat, round, brown discs.

Observations.

I. Delavayi was introduced into cultivation by the Paris Jardin des Plantes from seeds sent from Yunnan by the Abbé Delavaye. The type of Bot. Mag. t. 7661 (K) was raised at Kew from seeds obtained from Paris.

This decorative species, which is valuable for its habit of flowering in July, when most other Irises except *Kacmpferi* are past their best, is a relative of *sibirica* and *Clarkei*. All three agree in having the conspicuous buttresses at the base of the falls but differ in well-marked characters. Thus *sibirica* and *Delavayi* have hollow stems and foliage that is glaucescent on both surfaces, while the stem of *Clarkei* is solid and the leaves have a glossy upper surface. In *Delavayi* the standards resemble closely those of *Clarkei* in outline, but they are straight and held at an angle of 45° while those of *Clarkei* are usually curved and held almost horizontally. Moreover, the styles of *Delavayi* are not so curved as in *Clarkei* where the crests are carried down below the level of the centre of the styles.

The seeds of *Delavayi* and *Clarkei* are very similar but the capsules may be distinguished by the fact that in *Clarkei* the sides are flat with a distinctly prominent median ridge, while in *Delavayi* a depression runs down each side.

This species is distinctly a plant for wet ground and seems to do well in heavy soil (see also p. 19).

Seedlings do not vary to any appreciable extent nor has a white form yet appeared in cultivation, though the eventual appearance of such a form should create little surprise.

†*I. WILSONI*

(PLATE II)

C. H. Wright, in Kew Bulletin, 1907, p. 321.

*Bot. Mag. t. 8340 (1910).

DISTRIBUTION. Western Hupeh and Shensi.

West Hupeh. Fang, 1907, Wilson, 2371 (K).

Fang Hsien, 1907, Wilson, 3072 (K).

North Shensi. Thei-pai-shan, 1899, Giraldi (no. 6676) (B).

Huan-ton-san, 1899, Giraldi (no. 6674) (B).

Hua-tzo-pin, 1899, Giraldi (no. 6675) (B).

[N.B. Forrest's no. 1895 (West Yunnan on E. flank of Tali Range, 1906) (K) may possibly be a blue-flowered form of this Iris or it may be a specimen of *I. chrysographes* (see p. 28)]

Diagnosis.

I. Wilsoni Apogon; *I. sibiricae* similis sed segmenta interiora oblique erecta; capsula ovalis, pedicello longissimo suffulta; semina parva, crassa ut in *I. orientali*.

Description.

Rootstock, a close growing, slender rhizome of the *sibirica* type.

Leaves, linear-ensiform, acuminate, slightly glaucous on both surfaces, 2 ft. by $\frac{1}{2}$ in., the upper third drooping.

Stem, hollow, but with thicker walls than those of *I. sibirica*, about equal in length to the leaves, bearing a terminal head of two flowers and a much reduced leaf attached about the middle.

Spathes, two-flowered, valves narrow, acuminate, green, $2\frac{1}{2}$ —3 in. long.

Pedicels, of unequal length, 1—4 in. long, solid, triangular in section.

Ovary, $\frac{2}{3}$ in. long, sharply trigonal with a slight ridge on each face.

Tube, shorter than the ovary, with many indistinct ribs.

Falls. The broad haft has at its base two large purple-mottled flanges and bears thick broken veins of red-, or purple-, brown on a yellow ground. No constriction separates the haft from the ovate blade, which bears a semi-circular patch of bright yellow with red-brown veins, that break up into dots. The outer part is of a paler lemon-yellow with faint purplish veins.

Standards. The yellow, canaliculate haft is mottled with red-brown at the edges and the narrow lanceolate blade with frilled edges bears faint purple veins on a pale yellowish-white ground. The standards are not erect but extended at an angle of 45° .

Styles, narrower than the haft of the falls, deep yellow, arched high above the falls.

Crests, small, quadrate, overlapping.

Stigma, a very sharply pointed tongue.

Filaments, broad, yellow, rather shorter than the anthers.

Anthers, cream, reaching to the stigma.

Pollen, white.

Capsule, short, oval, with slightly convex sides, raised far above the remnants of the spathes on 4—6 in. pedicels.

Seeds, small, thick, D-shaped, not unlike those of *I. orientalis*.

Observations.

This fine Iris has only recently been introduced into cultivation by Messrs J. Veitch & Sons of Chelsea, for whom Mr E. H. Wilson collected seeds. It is uncertain as yet whether a purple-flowered form of this Iris exists, but certain herbarium specimens seem to point to the possibility.



Little can be said of its cultivation, except that it usually does well in conditions of soil and moisture that would be favourable to *I. sibirica*. It seems, however, more impatient of dry conditions than *I. sibirica*, if my own experience with seedlings during the drought of 1911 be any criterion. Many which might reasonably have been expected to flower perished outright by untimely withering, while *sibiricas* of the same age and in similar conditions came through unharmed.

When we have found the conditions in which *I. Wilsoni* will succeed, it should prove a great addition to our borders, for it will then be possible to have tall clumps of blue, white and yellow-flowered plants of the *sibirica* type.

I. Wilsoni is very floriferous and throws up a whole sheaf of stems after the manner of *I. sibirica*, to which it seems much more closely allied than to *I. orientalis*, both in this respect and also in the long pedicels, though its seeds are much more like those of the latter than of the former.

I. Wilsoni is distinguished from *I. Forrestii* by its larger growth, by the broader leaves which have a slight midrib (see Plate II), by the long pedicels, by the shape of the seeds and by the angle at which the standards are poised.

†*I. FORRESTII*

(PLATE III)

*Dykes, in Gard. Chron. June 25th, 1910, p. 418.

DISTRIBUTION. Open mountain pastures on the eastern flank of the Lichiang Range in North-west Yunnan.

Lichiang Range, 12—13,000 ft. 1910, Forrest, no. 6028 (E).

Diagnosis.

I. Forrestii Apogon; *I. Wilsoni* similis sed multo minor; *caulis* foliis subaequilongus, *pedicelli* breves; *segmenta* interiora erecta; *capsula* major, infra truncata, supra attenuata.

Description.

Rootstock, a very close growing rhizome of the *sibirica* type.

Leaves, narrow, linear, grassy, with glossy upper surface, but glaucous beneath, scarcely so long as the stems.

Stem, hollow, with thick walls, 12—18 in., bearing 2—3 reduced leaves and usually only a single head of two flowers, although a lateral 1-flowered branch sometimes develops.

Spathes, narrow, acuminate, keeled, 2—3 in. long, 1—2 flowered.

Pedicels, $\frac{1}{2}$ —1 $\frac{1}{2}$ in. not increasing as the capsules mature.

Ovary, $\frac{1}{2}$ in. trigonal, with very concave sides down each of which runs a slight ridge.

Tube, many ribbed, broad, slightly shorter than the ovary.

Falls. The short haft bears two central lines and broken lateral veins of brown-purple on a clear yellow ground. The oblong, ovate blade is in some instances very long and drooping, of a clear, lemon-yellow colour, which becomes deeper around the end of the style branches and is there marked with a few inconspicuous broken veins of brown-purple. The haft bears at the base the two projecting flanges, which are characteristic of the group.

Standards. The oblanceolate blade narrows gradually to a deeply channelled haft, yellow, shorter than the falls, slightly divergent but much more nearly erect than those of *I. Wilsoni*.

Styles, broad, short, keeled, deep yellow, often discoloured with purple, curving down on to the falls.

Crests, not reflexed, small, quadrate, overlapping.

Stigma, a rounded tongue.

Filaments, creamy yellow, faintly mottled purple in the upper part.

Anthers, cream, short.

Pollen, cream.

Capsule, trigonal, with a deep broad groove down each face, so as to be nearly trefoil in section; broad and truncate at the base and tapering to a point above, the withered tube remains attached to the apex.

Seeds, thin, flat discs, or D-shaped, with dark centre and pale periphery.

Observations.

This most pleasing Iris may be roughly described as a dwarf *I. Wilsoni*, from which it differs in the less glaucous leaves, which rather resemble those of *I. Clarkei* in possessing a glossy upper surface, in the clearer yellow, unveined flowers, in the upright and not spreading standards and in the capsules and seeds (see Plates II and III).

Little can be said at present of its cultivation except that it has so far succeeded to some extent under the same conditions of soil and moisture as *I. sibirica* and *I. Wilsoni*, though it is scarcely so tolerant of drought as the former proves to be when well established.

The few plants which I have already seen in flower, and which I owe to the kindness of Professor Bayley Balfour and Mr A. K. Bulley, for whom the seeds were obtained by Mr George Forrest, have been enough to prove that the segments of the flower are variable in shape. Those forms in which the blade of the falls is longest are the most handsome and desirable from the ornamental point of view. In some the blade is short and small and this defect greatly detracts from the appearance of the plant.

†‡ *I. CHRYSOGRAPHES*

(PLATE IV)

Dykes, in Gard. Chron. XLIX. p. 362 (1911).

*Bot. Mag. t. 8433 (1912).

DISTRIBUTION. The only known specimens of this Iris are those collected by E. H. Wilson in Western Szechuan at a height of 5—11,000 ft., and those found by George Forrest in Yunnan. Henry's Szemen (Yunnan) specimens are probably but not certainly identical.

West of Kuan Hsien, 7—11,000 ft. 1908, Wilson, no. 1304 (K).

West Szechuan, Washan, 5—8000 ft. 1908, Wilson, no. 3071 (K).

Tatsienlu, 11,000 ft. 1908, Wilson, no. 3070 (K).

Yunnan, 1910, Forrest, no. 6807 (E).

Yunnan; Szemen, 4—5000 ft. 18—, Henry, nos. 11,927, 11,927 A and B (K).

W. Yunnan; east flank of Tali Range, 9—10,500 ft. 1906, Forrest, no. 1893 (K).

[N.B. This last is not certainly *I. chrysographes* but may possibly be a blue-flowered form of *I. Wilsoni*. See p. 26.]

Diagnosis.

I. chrysographes Apogon; *I. orientali* similis sed *segmenta* interiora obliqua nec erecta; *spathae* omnino herbaceae, acutae; *semina* piriformia, compressa. Colore etiam atropurpureo distincta.

Description.

Rootstock, a slender rhizome of the *sibirica* type but not producing such dense growths.

Leaves, linear-ensiform, acuminate, slightly glaucous, 18 in. by $\frac{1}{2}$ in.

Stem, hollow, 15—18 in. long, bearing 1—2 reduced leaves.

Spathes, narrow, green, 3 in. or more in length, sometimes set $\frac{1}{2}$ in. apart on the stem.

Pedicels, of varying length, $\frac{1}{4}$ —2 in.

Ovary, trigonal.

Tube, short and thick, of the many ribbed *sibirica* form.

Falls. The oblong blade narrows abruptly to the oblong haft, which bears at its base the projecting flanges, which are a marked characteristic of the *sibirica* group. The haft bears a few broken golden veins on a deep violet ground. The broken veins extend some distance on to the blade, of which the rest is an intense violet-purple, of velvety texture.

Standards, oblanceolate, narrow, divergent as in *I. Delavayi*, deep violet.

Styles, much arched, keeled, coming close down on to the falls.

Crests, small, overlapping, subquadrate.

Stigma, a triangular tongue.

Filaments, purple.

Anthers, violet.

Pollen, cream.

Capsule, somewhat similar to that of *Bulleyana*, but tapering more gradually at either end; oval, trigonal, with a flange at each angle, a raised line down each face and a netted surface, $1\frac{1}{2}$ — $2\frac{1}{2}$ in. long.

Seeds, flattened, pyriform, with rather smooth coats, in some cases where the seeds are few in number and consequently not much flattened they bear a slight resemblance to those of *I. ensata*.

Observations.

This Iris is perhaps the most striking of all those recently introduced from Western China. I have had under observation about a dozen plants given to me as minute seedlings by Miss Willmott and labelled "Wilson 1304." When these plants flowered in 1911, it was at once obvious that they were identical with a specimen in the Kew Herbarium bearing the same number, which Mr Wilson had asked me to determine.

The foliage is somewhat scanty for a member of the *sibirica* group and resembles most closely that of *I. Clarkii*. The flowers are slightly raised above the leaves. The colour in all cases is a rich velvety red purple, but the amount of golden veining is variable, in some instances most striking (see Plate IV), and in others less conspicuous. Both the capsules and the seeds are quite characteristic and sufficient of themselves to mark *I. chrysographes* as a distinct species.

Cultivation is apparently easy in conditions favourable to the other members of the group (see p. 19).



I. CLARKEI

(PLATE V)

Baker, Hdk. Irid. p. 25 (1892).

in Hook. f. Fl. Brit. Ind. vol. VI. p. 275 (1892).

Dykes in Gard. Chron. XLVI. p. 15 (1909).

Bot. Mag. t. 8323 (1910).

SYNONYM.

I. himalaica, Dykes in Gard. Chron. XLV. pp. 3, 36 (1909).DISTRIBUTION. *I. Clarkei* is apparently confined to a circumscribed area in the Sikkim and Bhutan region at a height of from 6000 to 11,000 feet.

Tonglo (near Darjeeling), 1857, Thomson (K).

1875, Clarke (K).

1907, Cave (Hortl.).

Sikkim (Darjeeling), 1855, Schlagintweit (nos. 12,325, 12,389, 12,634) (B).

(Nijani), 1888, Dr King's collector (B).

Chumbi, 1879, Dungboo (B).

1884, Dungboo (K) (BM).

1904, Walsh (K).

Diagnosis.

I. Clarkei Apogon; *I. sibiricae* haud dissimilis sed *folia* supra nitida, infra glauca, *caulis* solidus, plerumque ramosus; *spatharum* valvae omnino herbaceae, virides.

Description.

Rootstock, a wide spreading, somewhat slender rhizome, clothed in the fibrous remains of old leaves.*Leaves*, linear-ensiform, about 2 feet long by $\frac{1}{2}$ — $\frac{3}{4}$ in. wide, the upper third drooping; the upper surface is polished and shiny, the under side glaucescent.*Stem*, about 2 feet long, solid, with one or two lateral heads and bearing about three reduced leaves.*Spathes*, 2-flowered, $2\frac{1}{2}$ —3 in. long with lanceolate, persistently green valves.*Pedicel*, $1\frac{1}{2}$ —2 in. long, triangular in section, increasing in length later to 3 in.*Ovary*, 1 in. sharply trigonal, sides slightly concave with a central rib on each face.*Tube*, $\frac{1}{2}$ in., much more rounded than the ovary, many ribbed.*Falls*, with conspicuous, whitish buttresses at the base of the haft, which is half as long as the obovate, emarginate blade. The upper part of the haft is slightly marked with yellow. The blade is of a blue purple colour marked and blotched with white, and reflexes laterally.*Standards*, lanceolate with a canaliculate haft, reddish-purple, poised almost horizontally.*Styles*, very conspicuous and forming the highest point of the flower. $1\frac{1}{2}$ in. long, keeled, very convex, much curved down, so that the stigma is considerably lower than the centre of the style.*Crests*, obtuse, overlapping with irregularly indented edge.*Stigma*, rounded triangular.*Filaments*, white, edged and mottled red purple.*Anthers*, pale mauvish white, shorter than the filaments.*Pollen*, white.*Capsule*, 2 in. long, sharply trigonal with flat sides, each having a prominent median rib.*Seeds*, compressed, thin discs, lying in a single row in each loculus.

Observations.

This curiously local species was first discovered by Sir J. D. Hooker on Tonglo in 1848 and sketched by him on the spot. This sketch is now in the Kew Collection and though unfinished gives sufficient detail to enable us to identify the plant. It bears the words "no crest or beard," written somewhat indistinctly and faintly in pencil and, by a curious mistake, Baker, when describing the species from J. B. Clarke's specimens, gave it both crest and beard and consequently placed it among his *Pseudevensia* group.

When the plants flowered that I obtained from Tonglo through the kindness of Mr G. H. Cave of the Lloyd Botanic Garden at Darjeeling, they could not be brought under Baker's description of *I. Clarkei* owing to the absence of beard and crest and it was only after I had described them under the name of *I. himalaica* (cf. Gard. Chron. l.c.) that Dr Stapf pointed out to me the origin of Baker's mistake.

I. Clarkei is obviously a member of the *sibirica* group but differs from all the other species of that group, except *I. prismatica*, in the possession of a solid, as opposed to a hollow, stem. In all other respects, it seems perhaps most closely related to the Western Chinese members of the group, *I. Forrestii* and *I. Bulleyana*, with which it agrees in having leaves, which are glaucous on the under side but polished and glossy above.

The colour of the flowers borne by this Iris varies greatly even in the wild state as was proved by a second series of plants that I owe to the kindness of Mr Cave. All shades of blue and purple may occur and one of the most pleasing perhaps is that depicted in Plate V.

In its native habitat, *I. Clarkei* grows in ground that is swampy for half the year and frozen hard under snow during most of the remaining months. In cultivation it should naturally do best in damp soil, rich in humus, but for some reason or other it has proved difficult to keep, for many plants have died out after flowering. Seedlings are fairly easily raised though the seeds do not germinate very readily and the plants are of somewhat slow growth.

No natural hybrids of this species are known but I have succeeded in fertilising it with pollen both of *I. sibirica* and of *I. Delavayi* and also with the Californian *I. Douglasiana*. The first two crosses were interesting as showing that the hollow stem is dominant over the solid stem in both cases while the last produced plants which represented a compromise between the two parents. The colour varied with that of the variety of *I. Douglasiana*, whose pollen was used. In one case this was a kind of buff pink and the resultant hybrid has flowers of a pleasing pink shade. Another curious feature is found in the leaves, which are not indeed green throughout the winter as are those of *I. Douglasiana* but they remain green long after those of *I. Clarkei* have withered and do not die down until quite the end of the year. They also possess the glossy upper surface, which is characteristic of *I. Clarkei*.

It is also of interest to note that all the three crosses produced plants, which do not need such moist conditions as *I. Clarkei*. The hybrids with *I. Douglasiana* in particular have flourished exceedingly even in dry Surrey sand in the summer of 1911 and in this respect partake far more of the character of their Californian father than of that of their Himalayan mother.

†*I. BULLEYANA*

(PLATE VI)

Dykes in Gard. Chron. June 25th, 1910, p. 418.

DISTRIBUTION. Unknown, but the plant is probably confined to Western China.

Diagnosis.

I. Bulleyana Apogon; *I. Clarkei* similis sed *caulis* fistulosus, *monocephalus*; *segmenta* omnia patula.

Description.

Rootstock, a closely tufted rhizome, of the *sibirica* type.

Leaves, somewhat resembling those of *I. Clarkei* but narrower, slightly tinged with pink at the base, with a glossy upper surface and glaucous below, linear-ensiform, 18 in. by $\frac{1}{2}$ in.

Stem, hollow with thick walls, 15—18 in. long, unbranched, bearing a single head of 1—2 flowers, two or three reduced leaves at some distance below the top.

Spathes, narrow, acuminate, keeled, 3—4 in., scarious at the tip.

Pedicels, of varying length, $\frac{1}{4}$ — $2\frac{1}{2}$ in. in second flower, at least 1 in. at the fruiting stage.

Ovary, $\frac{1}{2}$ — $\frac{3}{4}$ in. trigonal, with a distinct ridge down the centre of either face.

Tube, $\frac{1}{2}$ in., with the bases of the falls broadening and meeting over the bases of the standards, the dark colour of which just shows between them lower down.

Falls, with an oblong haft and obovate blade. The haft is veined and dotted with purple on a greenish-yellow ground. On the blade the colouring becoming clearer and consists of broken veins and blotches of bright blue-purple on a creamy ground. The extremity is of a uniform blue-purple growing paler at the edges.

Standards, oblanceolate, canaliculate, pale blue-purple with deeper veins, divergent at an angle of about 60°.

Styles, narrow at the base becoming slightly wider above, keeled, dark violet-blue, held high above the falls.

Crests, small, rounded quadrate, overlapping, edges entire, not serrate.

Stigma, a rounded tongue.

Filaments, purple, longer than the anthers.

Anthers, cream, faintly tinged with purple.

Pollen, cream.

Capsule, $1\frac{1}{4}$ — $1\frac{3}{4}$ in. long, tapering somewhat abruptly and equally at either end, oblong trigonal with a distinct flange at the angles and a raised line on each face. The surface is covered with a network of raised lines. The whole capsule is very similar to that of *I. Clarkei*.

Seeds, small thick discs or D-shaped, both smaller and thicker than those of *I. Clarkei*.

Observations.

The origin of this fine Iris is at present something of a mystery. I owe my specimens to the kindness of Mr A. K. Bulley, from whom I understood that they were from the same source as *I. Forrestii*. However, on my showing Mr Forrest an autochrom photograph of the Iris, he told me that he did not remember collecting the plant or even seeing it in the wild state.

I. Bulleyana is perhaps best described as an *I. Clarkei* with a hollow, unbranched stem. In some ways it is very close to *I. Forrestii* but its seeds and capsule and also the poise of the segments of the flower are quite different.

In cultivation it apparently requires the same conditions as *I. Forrestii*.



**I. PRISMATICA*

(PLATE VII)

(No explanation of the name is given.)

- Pursh, Fl. Amer. Sept. 1. p. 30 (1814).
 •Ker in Bot. Mag. 1504 (1813) quotes Pursh's MS. description.
 •Barton, Fl. III. 85 (1823).
 Roem. and Schult. Syst. Veg. 1. p. 476 (1817).
 Baker, J. L. S. XVI. 138 (1877).
 Hdk. Irid. 8 (1892).
 Lynch, Book of the Iris, p. 73 (1904).

SYNONYMS.

- I. gracilis*, Bigelow, Fl. Boston, p. 12 (1814).
 Specimen in Hb. BM.
I. virginica, A. Gray, Bot. North. U.S. p. 482 (1848) non Linn.
 Specimen in Hb. BM.
 Chapman, Flora South. States, p. 473, ed. III. p. 500.
I. boltoniana, Roem. and Schult. Sys. Veg. 1. Suppl. 308 (60) (1822).
I. trigonocarpa, Br. and Bouché, Ind. Sem. Hort. Berol. (1853) 17 ex parte.
 [Specimens of *I. trigonocarpa* in Hb.B. are confused with *I. sibirica*, both the species occurring together unseparated on the same sheet. The original description of *I. trigonocarpa* aptly describes *I. prismatica*, with which indeed it is said to agree in the structure of the capsule. Strangely enough *I. trigonocarpa* is said to differ from *I. prismatica* chiefly by its stoloniferous character, which is precisely the most striking peculiarity of the latter.]
I. carolina, •Radius, Beschreib. neuer Pflanzen, p. 158 (1822).
 Steud. Nomencl. ed. II. i. p. 821 (1840).

DISTRIBUTION. Marshy ground along the Atlantic Coast from Nova Scotia to Carolina.

- Cape Breton, Louisberg, 1883, Macoun (BM).
 Maine Marshes, Beyr (B).
 Massachusetts, Andover, 1880, Blake (K).
 Boston, Schweinitz (K).
 Boston, 1830, Boott (B).
 Bigelow (BM).
 Connecticut, A. Gray (BM).
 New York, Arlington and Staten Island, 1903, Henser (B).
 Newdorp, Staten Island, 1890, Small (W).
 New Jersey, 1832 and 1841, Torrey (E).
 1865, Henser (B).
 Rhode Island, Newport, 1883, Tweedy (B).
 Delaware, Wilmington, Canby (K) (B).
 Carolina and Georgia Mts, Buckley (BM).

Diagnosis.

I. prismatica imberbis, *I. sibiricae* haud dissimilis sed *rhizoma* late repens; *caulis* tenuis, solidus; *germen* triquetrum, alis conspicuis; *spatharum* *valvae* scariosae.

Description.

Rootstock, a very slender rhizome, sending out long thin stolons, which appear at some distance from the old stem.

Leaves, narrowly ensiform, acuminate, 24 by $\frac{3}{4}$ in., glaucous, finely but not prominently ribbed.

Stem, solid, slender, wiry, bearing a reduced leaf and usually a side branch, 18—24 in. high. The terminal head is 2—3-flowered and the side branch 1-flowered.

Spathic valves, acuminate, scarious, narrow, about 1 in. long.

Pedice, 1—2 in. long, increasing eventually to 3 or 4 inches.

Ovary, trigonal, with the corners so much exaggerated as to be almost wings.

Tube, very short but comparatively broad.

Falls. The relatively long haft expands into a small ovate blade and bears at its base two small flanges not so conspicuously marked as is usually the case with *I. sibirica*. The haft and the base of the blade are marked with violet veins on a greenish-white ground. The rest of the blade is pale violet with deeper veins.

Standards, lanceolate, violet, with a short canaliculate haft.

Styles, arched, narrow.

Crests, divergent, quadrate, with serrated upper edge, revolute.

Stigma, a triangular tooth.

Filaments, equal in length to the anthers, pale violet or red purple.

Anthers, deep bluish-purple.

Pollen, cream.

Capsule, trigonal with sharp projecting ridges running down each angle.

Seeds, buff-coloured, smooth, pyriform, more or less compressed and tending therefore to be cubical.

Observations.

This American species is quite distinct from the rest of the *sibirica* group but yet sufficiently closely allied with them to be included in it.

It is characterised by the peculiarly slender, wiry, solid stem, which does not grow straight but which is curiously bent and yet erect. It is also easily distinguished by the very widely creeping rhizome, which sends up the tufts of leaves at some distance apart. The capsules are most conspicuously winged at the angles and contain pale brown smooth-skinned cubical seeds, distinguishable from those of any other Iris.

The flower stems are freely produced and the graceful habit of the whole plant has a charm of its own. The flowers are not large but of a pleasing pale blue colour.

Seedlings have so far shown no variation and cultivation presents no difficulty. It is that of the other members of the group (see page 19). It will succeed in a position where it is in the shade during part of the day.

II. *The Tenuifolia Group.*

The three Irises, which form this group, namely *I. tenuifolia* Pallas, *I. ventricosa* Pallas and *I. Bungei* Maxim. are very imperfectly known and it is perhaps uncertain whether a better knowledge of them will not show that they really represent less than three distinct species. It is curious that Maximowicz in describing *I. Bungei* (Bull. Acad. Pét. xxvi. 1880, p. 509) should have distinguished it from *I. ventricosa* and from *I. songarica*, to which latter indeed the plant bears but a very slight resemblance and yet that he should have failed to mention *I. tenuifolia* to which it is undoubtedly much more closely allied.

The difficulties that surround these plants are increased by the fact that, in common with other Eastern and Central Asiatic Apogon Irises, they have very slender rhizomes, which will not survive complete desiccation. To work out the problem of their affinities it will be necessary to obtain fresh seeds. Of several consignments of *I. tenuifolia* that have reached me, most of the plants have failed to revive after the journey and the few that have begun to grow have produced very scanty leaves and continued flowerless. Seedlings would probably grow with much greater vigour and give us flowers in due course.

Meanwhile the following descriptions of these three species are necessarily incomplete. They are based on the original accounts and on the herbarium specimens that I have seen in the various collections and to some extent on imported roots growing in my garden.

No cultural directions can be given for there appears to be no record of the successful cultivation of these species in the gardens of Western Europe.

It is a curious fact that all the herbarium specimens of these species are surrounded by masses of remains of old leaves either burnt, or browsed, off at the length of 3 or 4 inches. The presence of these sheathing fibres often makes it extremely difficult to see much of the scanty leaves and short stem that spring from their midst. It is probable that all these species grow on steppes, where the dried remains of the vegetation of the previous year are burnt off in early spring to allow the young shoots to grow and provide food for the herds and flocks of the pastoral nomads.

1.	{	Spathes narrow, acuminate, membranous.	<i>I. tenuifolia</i> (p. 32).
		Spathes broad, pointed, oval, rigid	1.
		Spathes covered with a network of transverse fibres between the upright parallel ribs.	<i>I. ventricosa</i> (p. 34).
		Spathes covered with upright parallel ribs with no network of transverse fibres.	<i>I. Bungei</i> (p. 34).

† *I. TENUIFOLIA*

- Pallas, Reise, III. p. 714, no. 66, t. c. fig. 2 (1773).
- Ledebour, Fl. Ross. IV. p. 93 (1853).
- Maximowicz, Ind. Mongol. p. 485, in Prim. Fl. Amur. Suppl. (1859).
- in Bull. Acad. Pét. XXVI. p. 511 (1880).
- Mél. Biol. X. p. 697 (1880).
- Franchet, Plant. David. I. p. 297 (1884).
- Baker in Gdn. Chron. Ser. II. vi. p. 144 (1876).
- in J. L. S. XVI. p. 138 (1877).
- Hdk. Irid. p. 4 (1892).

SYNONYMS.

- I. acaulis*, Pall. Iter. III. p. 213 (1773).
- I. Leczyi*, Kanitz in Plant. Exped. Szechen. p. 58, t. 6, fig. 2 (1891)
- I. Regelii*, Maxim. ex Regel, Act. Hort. Pet. VI. p. 495 (1879).
- in Bull. Acad. Pét. XXVI. p. 526 (1880).

¹ This seems to be only a minute form of *I. tenuifolia*. The so-called beard is probably only the microscopic pubescence not uncommon on the falls of Apogon Irises. Maxim. (l.c.) himself says of *I. Bungei* "sepala ungue non glabra."



Neubeckia tenuifolia, Alefeld in BZ. XXI. p. 297 (1863).

Ioniris tenuifolia, Klatt in BZ. XXX. p. 502 (1872).

Maximowicz's var. *thianschanica* (Bull. Acad. Pet. Ic.) had broader leaves and a slightly longer stem than usual but does not seem to be of any great importance. It merely represents one of the variations that are bound to occur of so widely distributed an Iris (cf. infra Regel's specimens from near Kuldscha).

DISTRIBUTION. From the neighbourhood of Sarepta on the lower Volga to Central China

The Volga district. The lower Volga, 1898, Becker (B) (V).

Sarepta, 1829, Ehrenberg (B).

18—, Wunderlich (B) (K) (V).

1841, Fischer (B).

1887, Becker (V).

1879, Becker (BM).

The Ural district. The southern ridges, 1834, Lessing (B).

Lower part of Ural River, 1833, Lessing (B).

Deserts near the Caspian, 1838, Ledebour (K).

" " " 177—, Pallas (BM).

Turkestan. Between Aulia Ata and Utsch Bulak, 1896, Brotherns (B).

Source of the Dschirgahan, 1879, Regel (B) (K) (V) (BM).

Kuiankus (Kujannkusk), north of Ili River, 1877, Regel (B) (K) (V) (BM) (SP) (= Maximowicz's *I. Regelii*).

Near the Ili River, 1879, Regel (B) (K).

1886, Krassnow (B) (V).

River Irtysh between Koriakowo and Semipalatinsk, 1840, Karelin and Kirilloff (K) (V) (BM).

Almatythal near Kuldscha, 1878, Regel (V) (B) (K) (BM) = var. *thianschanica*.

Songaria, 18—, Schrenk (K).

Tibet and Afghanistan. N.E. Tibet, 1904, Filchner (B).

Khamba Jong, 1903, Younghusband (B) (E) (K) (BM).

Khojak Pass, 1888, Duthie (K) (BM).

18—, Griffith, no. 5902 (K).

Quetta, 1911, Keyes (HortD).

Chitral, 1895, Harriess (K) (BM).

China. Dahuria (Torei-nor), 17—, Pallas (Linn. Soc. Lond.).

W. Kansu, 1885, Potanin (K) (B) (V).

N. Shensi, 1901, Clemente and Giralddi, no. 6682 (B).

Western China, 1880, Przewalski (K).

Western Mongolia, 1885, Przewalski (K).

Diagnosis.

I. tenuifolia Apogon; *rhizoma* dense caespitosum, basibus foliorum vetustorum alte obvallatum, radicibus contortis rigidis; *folia* rigida, angusta, linearia; *caulis* brevis, monocephalus; *spathae* lineares, tripollicares, biflorae; *tubus* spathis aequalis vel etiam longior; *segmentorum exteriorum* lamina ab ungue vix distincta.

Description.

Rootstock, a thin rhizome, not unlike that of *I. ensata*, usually growing in crowded tufts but occasionally sending out stolons (cf. Becker's specimen from the Volga). The root fibres are hard and wiry and grow out from the rhizome at different angles, not vertically downwards as in other Irises.

Leaves, narrow linear, rigid, acuminate, 12 in. by less than $\frac{1}{4}$ in.

Stem, usually very short but sometimes as much as 6 in. long, sheathed in reduced leaves.

Spathes, narrow, membranous, closely wrapping the long tube, 3—4 in. long, 2-flowered.

Pedicel, very short.

Ovary,

Tube, very slender, 3—4 in. long, reaching above the top of the spathes.

Falls. The comparatively short blade is not separated by any constriction from the broad wedge-shaped haft. The colour is a blue-purple.

Standards, ob lanceolate, about as long as the falls.

Styles, narrow.

Crests, long and narrow.

Stigma, apparently bilobed.

Filaments,

Anthers,

Pollen,

Capsule, ovate or globular, about an inch long.

Seeds, cubical, dark-brown, with coarsely wrinkled coat.

I. BUNGEI

Maximowicz in Bull. Acad. Pét. XXVI. p. 509 (1880).

Mél Biol. X. p. 695 (1880).

Franchet, Pl. David. I. p. 296 (1884).

Baker, Hdk. Irid. p. 5 (1892).

SYNONYM.

I. ventricosa, Maxim. Ind. Mongol. p. 485 in Prim. Fl. Amur. Suppl. (1859) nec Pallas.

DISTRIBUTION. Mongolia (Zakildak Schabartu).

Between the ridges of Sumahada and Muni-ula, 1871, Przewalski (K).

Near river Hoang-ho, 1872, Przewalski (B).

[N.B. Both these specimens are quoted by Maxim. in his original description.]

Ourato, 1866, David (P) (B).

Thianschan, 1877, Przewalski (B).

Diagnosis.

I. Bungei Apogon; inter *I. ventricosam* et *I. tenuifoliam*; ab illa *spatha* striis tenuibus parallelis dense notata nec reticulata, ab hac *spatha* ventricosa nec anguste acuminata membranacea differt.

Description, taken chiefly from the Przewalski specimen at Kew, quoted by Maxim.

Rootstock, a slender rhizome growing in very crowded tufts.

Leaves, narrow, linear, about a foot long, flushed with purple at the base.

Stem, 3—6 in. long, clothed in one or two narrow leaves, the uppermost rising to the top of the spathes.

Spathes, 3—4 in. long by $\frac{3}{4}$ in. wide at the centre, ventricose, with parallel fibres, without the network of cross fibres found in *I. ventricosa*, 2-flowered.

Pedicle, very short.

Ovary, 6-ribbed.

Tube, $1\frac{1}{2}$ — $2\frac{1}{2}$ in.

Falls, panduriform, pale blue, much veined, the obovate blade being shorter than the haft.

Standards, of a deeper shade than the falls, equal in length to them and sometimes slightly broader, oblong spatulate.

Styles, narrow, only half the width of the standards.

Crests, linear.

Anthers, reddish.

Capsules, 3 in. long.

Observations.

This Iris comes between *I. tenuifolia*, from which Maximowicz omitted to differentiate it, and *I. ventricosa*. From the former it is separated by the rigid ventricose spathes, which however are covered not with netted fibres, as are those of *I. ventricosa* (see Fig. 3), but with close parallel ribs.

It has never apparently been in cultivation.



FIG. 3. Spathes of *I. ventricosa* (reduced) and enlarged drawing of the reticulated surface.

I. VENTRICOSA

(The name is derived from the inflated spathes.)

Pallas, Reise, III. p. 712, t. B, fig. 1 (1773).

Baker in J. L. S. XVI. p. 138 (1877).

Hdk. Irid. p. 5 (1892).

Maxim. in Bull. Acad. Pét. XXVI. (1880), p. 509.

DISTRIBUTION. According to Pallas it is found only near the valley of the river Argun on the frontier between Siberia and Manchuria, near Sektui (= Sektu-jew).

Dahuria, 17—, Pallas (BM) (LS) (V).

R. Argun, 1831, Turczaninow (K).

Diagnosis.

I. ventricosa Apogon; *folia* linearia; *spatharum* valvae magnae inflatae reticulazione distinctae; venae densae parallelae longitudinales trabeculis crebris transversis conjunguntur.

Description, taken from Pallas' specimens.

Rootstock,

Leaves, linear, under $\frac{1}{4}$ in. broad, 12 in. long, ribbed like those of *I. ensata*, thick.

Stem, about 6 in. long, bearing two reduced leaves, which closely clasp the stem.

Spathes, shorter and broader than in most specimens of *I. Bungei*, the valves covered with a network of fine transverse fibres between the longitudinal ribs (see Fig. 3).

Pedicle, short.

Ovary,

Tube, 1 in. or a little more in length.

Falls. The narrow obovate blade is only $\frac{1}{3}$ or $\frac{1}{4}$ as long as the slightly panduriform haft.

Standards, lanceolate.

Styles, narrow.

Crests, long, narrow, oblong.

Observations.

This Iris is apparently as rare in herbarium collections as it seems to be in nature. It is at once recognisable by the curiously netted spathe valves (see Fig. 3, p. 34).

It is unknown in cultivation.

III. The Californian Group.

In California itself and in the neighbouring States along the Pacific coast, there are to be found two sets of Irises, one with comparatively large rhizomes clothed in the broad tough remnants of the leaves of former seasons and the other with very slender wiry rhizomes and leaves that turn a warm red-brown as they die off, instead of the yellow-brown to which the leaves of other Irises fade. The former of these groups, of which *I. longipetala* is representative, is in many ways not unlike the Asiatic *I. ensata*. Its three members will be found described and separated at p. 89.

The eight species that form the Californian group, as here defined, resemble each other in their general habit of growth and whole appearance, though they differ in their structural details. All have very slender rhizomes, not much thicker than a quill, and the root fibres are comparatively few in number. The leaves are tough and rather thick and are noticeable among a collection of Irises for the red-brown colour to which they fade as they die. Unless the winter is exceptionally severe, the leaves of most of the species persist until the young growths appear in spring. *I. tenax* and *I. Hartwegii* being perhaps the most conspicuous exceptions, though even in the case of these two species the leaves do not die away completely at any time. A peculiarity, in which all the species apparently agree, is to be found in the pink colouration at the base of the shoots. In no other group of Irises is this colour so vivid or so persistent.

As garden plants, these Californian Irises are most valuable, owing to their almost evergreen foliage and to the delicacy and extraordinary range of colour to be found in the flowers. It may be said indeed that no two specimens of any of them are exactly alike in their colouring and they are also valuable in having a flowering period that continues over a longer period than that of most other species of Iris.

In spite of this, they are still comparatively rare as garden plants, owing largely to two causes. In the first place, they will not grow in a soil that is strongly impregnated with lime, and in the second, the paucity of their root fibres makes transplantation somewhat uncertain (cf. Fig. 4, p. 39, showing a rhizome of *I. bracteata*).

It should therefore only be attempted during the months from April till July, when growth is active and before the main root thongs have thrown out their lateral fibres. The nurseryman's habit of sending out all herbaceous plants in the autumn is fatal to these Californian Irises, and we can imagine that this is one reason why they are not more widely grown.

Fortunately, when once these Irises are established, they readily set seeds, which germinate freely. It should be noted, however, that the seeds do not germinate until March or April, in accordance with the almost invariable rule among Irises that the majority of the seeds germinate when the active growth from the rootstock begins. It is therefore essential that the soil in which these seeds are sown should be kept fairly moist at a time when dry east winds and the growing strength of the sun combine to parch the surface soil in England. My experience has been that, when, owing apparently to drought, the seedlings do not appear in spring, they are apt to appear with the setting in of the autumn rains. In this latter case, they should remain in the pots throughout the winter and, if very small, will benefit by the protection of a cold frame, where frosts will be less likely to uproot them.

It is unwise to plant out seedlings of any Californian Irises until they have made at least four leaves and are fairly sturdy. They must usually therefore remain in the seed pans until June or July. Between that time and the winter, however, they grow rapidly and there should be no danger of losing any from the effects of frost. If, for any reason, the seedlings cannot be planted out by August at the latest, they are probably better left in the pans, though I have succeeded with some that were planted nearly two months later and merely covered with a light during the winter.

All the species seem to delight in a light warm soil, well enriched with humus in the form of thoroughly decayed leaf soil. The plants then grow rapidly into large clumps, which flower most profusely. *I. tenax*, especially, is capable of producing so many flower spikes that the foliage is entirely hidden beneath the mass of flowers.

Moisture is needed when growth is rapid in March and April, but in the late summer a thorough roasting in the sun, far from being detrimental to the plants, seems to ensure a more abundant display of flowers in the following season.

Of many of the species of this group, there are undoubtedly some fairly well marked local forms, such as the *I. Watsoniana* Purdy, a variety of *I. Douglasiana* with short stiff fan-shaped tufts of leaves and dark flowers or *I. amabilis* Eastwood, which also I have so far failed to distinguish specifically from *I. Douglasiana*. The extraordinary variations in colour and growth that occur among the plants in cultivation have led me to take the view that, if we were to describe one or two of these forms under specific or even varietal names, we should have to describe an indefinite number, all equally different and yet all agreeing essentially in their structural details.

The species that form this group may be separated as follows:—

- | | | | |
|----|---|----|---|
| | { Stems branched | 1. | |
| | { Stems unbranched | 2. | |
| 1. | { Tube linear, at least $\frac{1}{2}$ in. long, spathes green. | | <i>I. Douglasiana</i> ¹ (see p. 36). |
| | { Tube funnel-shaped, very short; spathes scarious. | | <i>I. tenuis</i> (see p. 37). |
| 2. | { Perianth tube short, funnel-shaped. | 3. | |
| | { Perianth tube at least 1 in. long, linear | 4. | |
| 3. | { Stem clothed in short, bract-like leaves, spathes broad. | | <i>I. bracteata</i> (see p. 38). |
| | { Stem bearing only 1—2 narrow leaves and spathes with narrow, often distant valves. | | <i>I. tenax</i> (see p. 39). |
| | (N.B. <i>I. Hartwegii</i> (see p. 40) is probably only a local form or, at most, a subspecies of <i>I. tenax</i> .) | | |
| 4. | { Style branches longer than the crests | 5. | |
| | { Style branches equal to the crests. | | <i>I. tenuissima</i> (see p. 44). |
| 5. | { Stem clothed in short, inflated bracts. | | <i>I. Purdyi</i> (see p. 42). |
| | { Stem bearing only 1—2 narrow, linear leaves. | | <i>I. macrostiphon</i> (see p. 43). |

⁴*I. DOUGLASIANA*

(PLATE VIII)

Herbert in Hooker and Arnott, Bot. Voy. Beech. 393 (1841).

non Regel, Gartenflora, t. 1222 (= *I. Purdyi*).

*Bot. Mag. 6083 (1874)

*Baker, J. L. S. XVI 138 (1877)

*The Garden, 1896, t. 1086.

Purdy in The Garden, 1898, Jan. 1

SYNONYMS.

I. Beecheyana, Herbert, l.c.

[N.B. Herbert's type is preserved (K).]

I. humilis, Beechey, MS. (K), cf. Hooker and Arnott, Voy. Beech. p. 160 (1833).

I. Watsoniana, Purdy in Erythraea, v. 128.

[The plants that Purdy obtained from the neighbourhood of Bodega Bay appear to be only a form of *Douglasiana* and not to deserve specific rank, cf. supra.]

I. amabilis, Eastwood in Bull. Torrey Club, xxx. p. 484 (1903).

Described from specimens collected by C. W. Kitts near Nevada City, California, as being very near to *I. Douglasiana* but with leaves narrower and of a paler green, very sharply attenuate. The tube is said to be longer and more slender and the flowers to be delicately scented. The standards were pale cream or lilac white, marked with lilac dots or veins, and the lanceolate falls a pale lilac.

Copeland's specimen (K), named *I. Hartwegii* by Greene, from the Big Basin of Pescadero Creek, San Mateo Co., 1903, seems to me very similar. I was able to show this specimen to Miss Eastwood and she at once recognised the similarity.

I incline to think that we have here only a slender growing form of *I. Douglasiana*, such as is depicted in the pale coloured form on Plate VIII. The chief difficulty in the way of this identification is the fact that Nevada City is further from the sea than any other known station for *I. Douglasiana*. If, however, the Pescadero specimen is identical, this difficulty is largely removed.

See also the Observations.

DISTRIBUTION. This Iris appears to be confined to the coastal region of California.

California, 1833, Douglas (BM) (K).

Humboldt Co., Trinidad, 1792, Menzies (BM).

Mendocino Co., Ukiah, 1864, Bolander (K).

Sonoma Co., Bodega Bay, 1902, Heller and Brown (B) (V).

Marin Co., Corte Madera, 1904, Heller (B).

Sausalito, 1868, Kellogg and Harford (BM).

San Mateo Co., San Francisco, 1851-4, Behr (V).

Crystal Springs Lake, 1902, Baker (B) (V).

Portola, 1903, Elmer (B) (V).

San Bruno Hills, 1900, Elmer (V).

¹ It is important to remember that weak specimens of *I. Douglasiana* may have an unbranched stem.

Santa Clara Co., Los Gatos, 1904, Heller (B)

Monterey Co., Monterey, 18—, Herbert (BM).

1902, Elmer (K).

Pacific Grove, 1903, Heller (B)

Diagnosis.

I. Douglasiana; imberbis; *rhizoma* gracile, late repens; *folia* ensiformia, basi rosea, per hiemem persistentia; *caulis* foliosus plerumque ramosus; *spathae* biflorae vel triflorae, valvis viridibus; *ovarium* pedicello paullo brevius, tubo paullo longius; *segmenta* exteriora oblanceolato-cuneata, interiora paullo breviora, lanceolato-unguiculata; *capsula* trigona.

Description.

Rootstock, a slender, wiry rhizome of a dark red-brown colour.

Leaves, 12—18 in. long, $\frac{3}{8}$ — $\frac{1}{2}$ wide, sometimes very stiff and dark, but usually pale green and narrow, bending over in the upper third, pink near the base.

Stem bearing a terminal head of 3 flowers and 1—2 lateral 1—2-flowered branches.

Spathe valves, dark green, pointed, stout, rigid, 3-flowered, 3 in. long.

Pedice, 1—1 $\frac{1}{2}$ in.

Ovary, 1 $\frac{1}{4}$ in., tapering at either end, acutely trigonal.

Tube, $\frac{1}{2}$ —1 in., varying in colour, green in the light-flowered forms and purple when the flowers are of a deep shade.

Falls. It is almost impossible to give a detailed description of the falls of this Iris, so infinite is the variety of colour forms that it may assume. However the shape remains fairly constant. The haft is broad and passes without any constriction into the broadly oblanceolate blade. Along the centre runs a slightly raised ridge flanked by about four parallel dark lines on a light, usually creamy ground. On either side of this similar lines branch out obliquely, and this veining extends some way on to the blade, the rest of which is uniform in colour with slight inconspicuous veinings of some darker shade than the rest of the surface.

Standards, slightly shorter than the falls, lanceolate with a canaliculate haft. The colour is the same as that of the main colour of the falls.

Styles, narrow, keeled, of the same colour as the standards.

Crests, coarsely dentate, triangular or quadrangular.

Stigma, a projecting, triangular tongue.

Filaments, pale violet.

Anthers, purple.

Pollen, cream.

Capsule, trigonal, with sharp angles 1 $\frac{1}{2}$ —2 in. long, tapering equally at either end.

Seeds, small, spherical, with finely wrinkled coats.

Observations.

This is apparently a very variable Iris, and Plate VIII illustrates two extreme forms. That with the dark flower has very dark green, short, thick leaves that grow in distinctly fan-shaped tufts, while the other has narrower and less rigid leaves of a paler green. My experience of many seedlings of *I. Douglasiana* has been that no two are precisely alike, though all of them are easily distinguishable from any other Iris. The leaves remain green throughout the winter and at once attract notice at that time of year in any Iris garden. The ovary is sharply trigonal and tapers at either end to the pedicel below and above to the linear tube of variable length. The ripe capsules of all the other Californian Irises are rounded in outline or section, and quite distinct from the sharply-angled fruit of *I. Douglasiana*. Moreover it is the only member of the group that has practically spherical and not thick D-shaped or cubical seeds.

The endless variety of colour forms of this Iris is perfectly amazing. One of those illustrated is one of the palest and largest, but other pale forms are a nearer approach to yellow or even pale mauve. From this latter a whole series of forms can be traced to the deepest coloured form which is also illustrated. The amount of veining is also liable to considerable variation. In some cases it is practically non-existent, but in others the white-veined patch on the blade of the falls is very striking.

In some strong growing specimens the stem branches once or twice, and each lateral stem bears a head of two or three flowers. When the plant is well grown, three flowers are more common than two in a spathe—a feature in which it differs from the other members of the group.

For cultivation, see the introductory remarks on the Californian group.

I. TENUIS

S. Watson in Proc. Amer. Acad. XVII. p. 380 (1882).

*in Garden and Forest, I. p. 6 (1888).

DISTRIBUTION. This rare Iris is apparently confined to the north-western corner of Oregon, where it was first discovered by Henderson in 1881 near the Eaglecreek branch of the Clackamas River, growing in broad mats in the fir forests.

Oregon, Washington Co., 1884. Henderson (K).

Diagnosis.

I. tenuis Apogon; *I. Douglasianae* haud dissimilis sed tenuior; *spathae* scariosae; *segmenta interiora* exterioribus breviora, emarginata.

Description.

Rootstock, a slender, very widely creeping rhizome.

Leaves, thin, ensiform, about equal in length to the stems, pale green, 12 in. long by $\frac{1}{2}$ in. broad.

Stem, about 12 in. long, bearing a reduced leaf near the base and at the insertion of the lateral peduncles, which are two or three in number.

Spathe valves, scarious, an inch long, apparently 1-flowered.

*Pedice*l, short, $\frac{1}{2}$ in.— $\frac{5}{8}$ in.

Ovary, elliptical.

Tube, very short.

Falls, oblong, spathulate, spreading, white marked with yellow at the throat and with blue-purple veins.

Standards, erect, emarginate, slightly shorter than the falls.

Styles,

Crests, narrow, entire.

Stigma,

Filaments, equal in length to the anthers.

Anthers,

Pollen,

Capsule, oblong, ovate, obtuse, $\frac{3}{4}$ in. long.

Seeds,

Observations.

This Iris, which does not appear to be at present in cultivation, was discovered in 1881 by Mr L. F. Henderson of Portland, Oregon, near a branch of the Clackamas River, called Eagle-creek, about thirty miles from Portland. It grew there in dense mats in the fir forests, its very long and slender rootstocks running along near the surface of the ground, just covered by moss or partly decayed fir needles, with a light addition of soil.

Owing to the slender character of its rhizomes it would probably be difficult to transplant and to establish unless a stock of seeds could be obtained.

I. tenuis is at once distinguishable from all other Irises from Western America by its deeply forked stems.

†† *I. BRACTEATA*

S. Watson in Proc. Amer. Acad. XX. 375 (1885).

Garden and Forest, 1888, 43.

*Gard. Chron. XXXIX. 1906, p. 401.

DISTRIBUTION. Oregon.

Waldo and Dear Creek Mts, Oregon, 1887, Howell (K).

Diagnosis.

I. bracteata imberbis; *rhizoma* gracile, radicibus perpauis; *folia* perpauca, superne levigata, inferne glaucescentia; *caulis* monocephalus, bracteis brevibus omnino vestitus, foliis brevior; *perianthii tubus* brevissimus; *stigma* triangulare.

Description.

Rootstock, a slender, wide-creeping rhizome, branches few, growths scattered.

Leaves, 12—24 in. long, linear, few in number, rigid, $\frac{1}{4}$ — $\frac{1}{2}$ in. broad, with a glossy upper- and glaucous under-surface.

Stem, 4—6 in., sheathed in narrow acuminate bract-like leaves.

Spathe valves, 3—4 in., narrow, acuminate, 2-flowered.

*Pedice*l, 2 in.

Ovary, $\frac{3}{4}$ in., broader in the upper part and narrowing somewhat abruptly to the tube but tapering off gradually to the pedicel.

Tube, funnel-shaped, very short, about $\frac{1}{2}$ in.

Falls. The broad oblanceolate blade narrows gradually to the broad haft. The blade is marked by four conspicuous veins, the inner pair being nearly parallel and continuing nearly to the apex; the outer pair are more curved and fade away sooner, the colour of the veins being brown purple and that of the ground a bright yellow.

Standards, lanceolate with a gradually tapering haft, of the same shade of yellow as the falls.

Styles, keeled, narrow.

Crests, large, subquadrate with serrated edges, revolute.

Stigma, a triangular tongue.

Filaments, bearing a few hairs near the base, shorter than the anthers.





Anthers, long and narrow.

Pollen, cream.

Capsule, almost circular in section, oblong, narrowing abruptly at either end.

Seeds, thick wedge-shaped, almost cubical.

Observations.

The growth of this curious Iris is perhaps more scanty than that of any other known species. Its slender rhizome creeps widely but has few branches, so that the growths appear at some distance from each other. Moreover, only about two of the long dark green leaves grow from each point. These and the flower stems appear together in spring some inch or more in front of the previous year's growth, which then withers away.

The points of resemblance and difference between this Iris and *I. Purdyi* will be found described in the Observations on the latter.

Some very beautiful hybrids or colour varieties of this Iris have appeared in my garden. I am unfortunately unable to give full details as to their parentage but can say definitely that they arose from seed of *I. bracteata* that was not the result of artificial pollination. Both *I. Douglasiana* and *I. tenax* were growing near the seed-parent and it is possible and indeed likely that the latter was fertilised by the agency of some bee with the pollen of one or the other of these two.

The plants are vigorous and very floriferous and the chief characters that point to their being of hybrid origin are to be found in the much closer growth and in the red, almost crimson colour of the flowers. One plant produced no less than eleven flower stems, at its first flowering in two years from seed, and though the shade of colour has varied in the individual plants, the characteristic veins of *I. bracteata* are visible in all cases on the blade of the falls. The perianth tube and ovary resemble those of *I. bracteata*.

Cultivation is, in general, the same as that of the other members of the group (see p. 35), but *I. bracteata* seems to be even more impatient of removal than any of the other species. Plants should always be raised from seeds and planted out permanently where it is intended that they should remain.

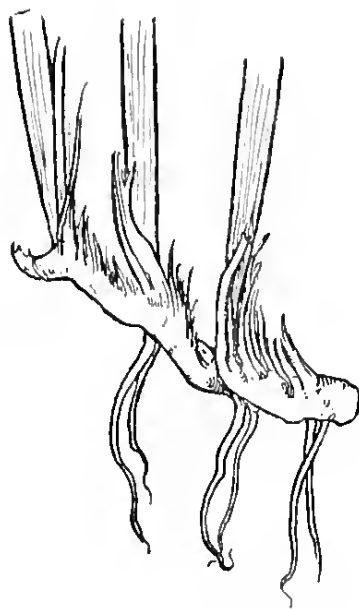


FIG. 4. The rhizome of *I. bracteata*.

†*I. TENAX*¹

(PLATE IX)

*Douglas in Bot. Reg. t. 1218 (1829).

*Bot. Mag. t. 3343 (1834).

Baker in J. L. S. XVI. 138 (1877).

Hdk. Irid. p. 7 (1892).

Hooker, Fl. Bor. Amer. II. p. 206.

Purdy in The Garden, Jan. 1st, 1898.

*Carrington Ley in The Garden, 1898, p. 518, t. 1175.

SYNONYM. *Ioniris tenax*, Klatt BZ. XXX. (1872), p. 502.

DISTRIBUTION. Washington, Oregon.

Baker's statement (Hdk. Irid. p. 7) that this Iris is found in British Columbia is probably based on a misconception of the situation of Fort Vancouver and the Columbia River.

The supposed Newfoundland specimen, Douglas (K), is presumably wrongly labelled, for besides the word Newfoundland it also bears the indication "from Cape Mendocino to Puget Sound," which is in Washington.

Further confusion has been caused by the fact that a label bearing the words "New Brunswick, Mt Kendel" has been stuck on a sheet of specimens of *I. tenax* (K), which on the sheet itself are rightly named and which were collected by Tolmie in "N.W. America."

Washington. Montesano, Chehalis Co. Wash. 1898 (B) (E).

Mt Tacoma, Wash. 1904, Elves (K).

Fort Vancouver, 1825, Douglas (BM).

Columbia River, 1841, Hinds (K).

Cape Mendocino to Puget Sound, 1825, Douglas (K).

Oregon. Oregon City, 1865, Brown (E).

Umpqua Valley, 1853, Jeffrey (E).

Oregon, 1871, Hall (BM).

Coast Range and Willamet Valley, 1877, Moseley (K).

Portland, 1905, Palmer, no. 1427 (W).

See also *I. Hartwegii* (p. 40).

¹ The name was probably given with reference to the strength of the leaves, from the fibres of which the Indians weave twine or cord.

Diagnosis.

I. tenax imberbis; *rhizoma* gracile, breviter repens; *folia* lineari-ensiformia, tenacissima, cauli subaequilonga, glaucescentia; *caulis* pedalis vel paullo longior, foliosus, monocephalus; *spathae* 1—2 florum, valvis lanceolatis, herbaceis, inter se plerumque remotis; *pedicellus* pollicaris; *tubus* brevis; *segmenta exteriora* obovato-cuneata, venosa, *interiora* erecta, lanceolato-unguiculata.

Description.

Rootstock, a slender rhizome, producing crowded tufts.

Leaves, linear rather than ensiform, tapering to a fine point, somewhat lax.

Stem, about a foot long, slender, bearing one or two reduced leaves.

Spathe valves, 2—3 in. long, quite green, acuminate, usually 2-flowered.

Pedicel, $\frac{1}{2}$ —2 in., the second flower being carried above the first by the longer pedicel.

Ovary, obscurely trigonal and marked with six grooves, which are more obvious in the upper part, which is slightly wider than the lower end.

Tube, $\frac{1}{4}$ in. or less, usually tinged with purple.

Falls, lanceolate unguiculate; the centre of the haft and the lower part of the blade is white veined with any shade from pearly grey through mauve to a deep claret colour. The upper part of the blade is of the same colour as the veins and the central ridge is yellow.

Standards, lanceolate, unguiculate, of the same colour as the blade of the falls.

Styles, narrow, acutely keeled.

Crests, large, quadrate, reflexed.

Stigma, a triangular, projecting tongue.

Filaments, short, covered with minute hairs.

Anthers, long, reaching almost up to the stigma.

Pollen, yellow.

Capsule, oblong, 1—1 $\frac{1}{2}$ in. long, rounded, with six ribs.

Seeds, light or dark brown, thick D-shaped, no conspicuous raphe or aril.

Observations.

This Iris deserves to be far better known and much more widely cultivated than appears to be the case. It is not perhaps the easiest Iris to transplant but, if the operation is performed not long after the flowers have faded or when growth is beginning in March or April there should be a fair chance of success.

Fortunately, to counterbalance the difficulties of transplantation, this Iris is very easily raised from seeds and the seedlings quickly grow to flowering size. If the seedlings are large enough—that is to say when they have produced about 3 or 4 leaves of as many inches in height—they should be planted out into their permanent quarters by midsummer and should then in many cases be large enough to flower in the following year.

Much variety in colour will be found among the seedlings, from the palest pearly grey to a rich red claret. The flowers are comparatively large in view of the slenderness of the leaves and rootstock.

There is no difficulty in the cultivation of this Iris, provided that it can be given a light soil, fairly rich in humus and not strongly impregnated with lime.

For the relationship of this Iris with *I. Hartwegii*, see the Observations on the latter.

I. HARTWEGII

(PLATE X)

Baker in Gard. Chron. 1876, II. p. 323 and in Journ. Linn. Soc. XVI. p. 138 (1877).

Baker, Hdk. Irid. p. 6 (1892).

[N.B. It is extremely doubtful whether this plant is really worthy of specific rank. I can find no botanical characters on which to separate it from *I. tenax* and yet the two plants, when growing side by side, are somewhat dissimilar, quite apart from the usual difference in colour. It seems best to leave the question open until more material enables a satisfactory answer to be given to it.]

DISTRIBUTION. This Iris is said to be confined to an area which extends for some four or five hundred miles along the foothills of the Sierra Nevada in California, from Plumas County in the north to the San Bernardino Mountains in the south at elevations varying from 1500 to 7000 feet. Possibly, however, it is only a colour form of *I. tenax*. See Observations.

Plumas Co., 1876, Austin (K).

Sacramento Co., 1848, Hartweg (K) (BM) (V).

Amador Co., Irishtown, 1895, Hansen (K) (BM).

Panther Creek, 1895, Hansen (K) (BM) (E) (B) (P).

Elsie's Creek, 1896, Hansen (B) (P).

Agricultural Station, 1894, Hansen (B).

Calaveras Co., Big Tree Grove, 1884, Ball (K) (B).

Fresno Co., Pine Ridge, 1900, Hall and Chandler (K) (B) (E).



Iris siliqua

Kern Co., Green Mts, 1888, Palmer (K) (BM) (P).
 San Bernardino Mountains, 1895, Parish No. 3760 (B)¹.
 1899, Hall (K) (B).
 Bear Valley, 1900, Davidson, No. 2241 (W)¹.
 San Diego Co., Lake Cuyamaca, 1903, Le Roy Adams (E).

Description.

Rootstock, a slender, hard, wiry, short creeping rhizome.

Leaves, linear, somewhat thick and firm, yellowish green, finely veined, 8—12 in. long by $\frac{1}{8}$ to $\frac{1}{4}$ in. broad.

Stem, slender, wiry, 6—10 in. to the base of the spathes, usually bearing a sheathing leaf.

Spathe valves, firm, green, keeled, lanceolate, $1\frac{1}{2}$ —4 in. long, one valve being often set an inch or more below the other on the stem; usually 2-flowered.

Pedicel, 1—3 in. long.

Ovary, 6-ribbed, almost cylindrical.

Tube, very short, of a yellowish green colour.

Falls, obovate cuneate, emarginate, narrowing abruptly at the base, of a pale creamy yellow colour with a raised yellow central ridge and veins of a deeper tone. Round the end of the central ridge the surface of the blade is covered with minute papillae, scarcely visible to the naked eye.

Standards, oblanceolate cuneate, slightly longer than the falls, of a creamy pale yellow, veined with a deeper shade.

Styles, of a pale straw colour.

Crests, quadrate, overlapping.

Stigma, a triangular tongue.

Filaments, pale yellow, ciliate.

Anthers, creamy, reaching the stigma.

Pollen, creamy.

Capsule, about an inch long, nearly cylindrical, but slightly 6-ribbed.

Seeds, cubical or nearly so, with coarsely wrinkled yellowish brown coats, the latter being firmly attached to the seeds proper, not loose as in *I. spuria*.

Observations.

When this iris was first discovered by Hartweg in 1848 in the mountains of Sacramento in California, it was recognised as coming very near to *I. tenax* Dougl. It was not until Baker worked at the genus that it was separated as a distinct species. Even then no clear distinction was drawn between the two. In fact, the differentiae are hard to find. The most obvious difference lies in the colour of the flowers, which in *I. Hartwegii* are always of a pale straw colour, and yet, though seedlings have shown no variation, no great importance can be attached to mere colour as a specific character. Moreover, *I. Hartwegii* agrees with *I. tenax* in one remarkable characteristic, namely in the arrangement of the inflorescence, which is of a type not often found in other species. In both, when two flowers are present, the lower spathe valve is set some distance below the other outer valve and the pedicel of the first flower is very short, while that of the second, which emerges from between the two inner valves, is much longer (see Plate IX).

On the whole, we are perhaps almost justified in regarding *I. tenax* and *I. Hartwegii* as subspecies or as local forms of one species, especially as such specimens as Davidson's from the San Bernardino Mountains (W) have purple flowers and are therefore indistinguishable from *I. tenax*, at any rate as herbarium specimens.

I. Hartwegii is not common in cultivation in this country, partly because it can rarely be transplanted with success except when growth is active in spring or early summer and partly, no doubt, because it is at best a weak-growing and rather insignificant species. It is best propagated from seeds, which germinate freely and which should be sown where the plants are to remain. In its native home in California it grows in very loose soil, either red volcanic debris or granitic sand, in dry pine woods, where it seldom gets really wet. We must not, however, infer from this fact that it will prosper in the shade in England, for the darkness of shady places in our gardens must be very different from the shade of pine trees under the hot Californian sun. Experience of its cultivation has shown that it does well in light sandy non-calcareous soil in a sunny, well-drained position. The plants that I have had in cultivation were raised from seeds, which I owed to the kindness of Mr Carl Purdy.

N.B. Since the above was written I have received a letter from Mr S. B. Parish containing a description of his *I. Hartwegii* var. *australis*². This is the plant which Foster was inclined to name *I. Parishii*³, without, however, ever proceeding to the actual publication of the name.

¹ These are apparently examples with purple flowers.

² See *Erythraea* vi. p. 86 (1898).

³ Purdy's statement in *The Garden* for Jan. 1st, 1898, to the effect that Foster described as *I. Parishii* the iris from the San Bernardino Mountains in Southern California, which had been long looked upon as *I. missouriensis*, is apparently based on a misapprehension. Among Foster's papers I find two letters from Parish on the subject. The first, dated 15th Jan 1897, asks for a description of the plant to which Foster had tentatively given the name of *I. Parishii*. The second, written on

Unfortunately Mr Parish does not say how his plant, which grows in open coniferous forests at an elevation of from 5000—6000 feet, is to be distinguished either from *I. Hartwegii* or from *I. tenax*. The colour of the flowers is light blue with darker veins and I take the expression "bracts distant" to mean that the spathe valves are set at some distance apart on the stem,—a feature that has already been mentioned as characteristic of both *I. Hartwegii* and *I. tenax*.

On the whole, I am inclined to think that there is no specific difference between *I. Hartwegii* and *I. tenax*, but that this is only one more instance of a Californian species, which varies in colour in different localities. I hope shortly to obtain seeds of the San Bernardino plant and thus to be able to compare it with *I. tenax* from Oregon and Washington.

+ *I. PURDYI*

(PLATE XI)

*Eastwood in Proc. Calif. Acad. Sc. Ser. III. i. 78, t. VII. fig. 2 (1897).

*Gartenflora, t. 1222 (1886) sub nomine *I. Douglasiana*.

Purdy in The Garden, Jan. 1st, 1898.

SYNONYM.

I. Douglasiana, *Regel Gartenflora, t. 1222 (1886).

DISTRIBUTION. The redwood region of Sonoma and Mendocino counties in California.

This rare plant does not appear to have found its way into European herbaria. The description here given is based on plants sent by Purdy and now growing in my garden.

Diagnosis.

I. Purdyi imberbis; *I. bracteata* similis sed *perianthii tubus* linearis, elongatus, ovario duplo longior; stigma truncatum.

Description.

Rootstock, very thin and wiry and producing very few, but thick, roots.

Leaves, almost erect, thick, at first of a pale yellowish green, but becoming deep green when fully developed, $\frac{1}{2}$ — $\frac{3}{4}$ by 12 in.

Stem, 4—6 in., entirely covered with short, inflated, bract-like leaves.

Spathe valves, $1\frac{1}{2}$ —2 in. long, the outer slightly keeled, green, inflated.

Pedicel, $\frac{1}{4}$ in. in second flower, none in first; growing eventually to $\frac{3}{4}$ and $\frac{1}{4}$ inch.

Ovary, $\frac{3}{4}$ in., tapering at either end, trigonal, with concave sides and a groove down each corner.

Tube, $1\frac{1}{4}$ — $1\frac{1}{2}$ in., yellowish green.

Falls. The broadly lanceolate blade is equal in length to the wide wedge-shaped haft. The colour is a pale straw yellow veined conspicuously with brown purple.

Standards, lanceolate, spreading, not erect, with wavy edges; pale straw yellow very faintly veined with brown purple, slightly shorter than the falls.

Styles, narrow, short, keeled.

Crests, very large, triangular.

Stigma, entire, not pointed as in *I. bracteata*.

Filaments, broad at the base and tapering upwards, yellow, ciliate at the edges.

Anthers, longer than the filaments, the sacs being well separated, pale mauve with deep purple edges.

Pollen, pale yellow.

Capsule, 1 in. long, much rounded, trigonal, narrowing abruptly at either end, at the top to a short beak, which consists of the remnant of the tube.

Seeds, thick D-shaped or irregularly cubical, light brown or buff.

Observations.

This comparatively rare Iris is in some ways very similar to *I. bracteata*, from which, however, it is sharply distinguished by very obvious differences. The foliage of both consists of scanty, tough dark green leaves, those of *I. bracteata* being both longer and broader and less numerous than those of *I. Purdyi*. The flowers of both are yellow, those of *I. bracteata* being deeper in shade, but both have the curiously arranged brown crimson veins, which can be seen in *I. Purdyi* (Plate XI). The most obvious difference, especially when dealing with herbarium specimens, lies in the fact that the perianth tube of *I. Purdyi* is linear and over an inch long, while that of *I. bracteata* is funnel-shaped and less than half an inch long. A less noticeable but yet reliable point of difference is to be found

Feb. 1st, 1898, contains the statement that, on going more carefully into the matter, he had found that the proposed species came too near to *I. Hartwegii* to be distinguished by a specific name.

The evidence was completed by a letter which I received from Parish in February 1912, in which he stated that in the end Foster failed to publish any description of the plant and that he himself had drawn attention to it in *Erythraea* (l.c.) under the name of *I. Hartwegii* var. *australis*.

The Iris akin to, or identical with, *I. missouriensis* which grows in the same district, is mentioned under that species, and it is clear that this was not the plant which Foster was at one time inclined to name *I. Parishii*.



in the stigmas. That of *I. bracteata* is distinctly tongue-shaped, whereas that of *I. Purdyi* is truncate, so that it ends in a straight, horizontal line.

Cultivation does not appear to be difficult when once the plant is established, but it is just as exacting as all the other Californian Irises with regard to the time at which it can be moved with success. This operation should always be carried out when growth is active in spring or early summer. With regard to soil, lime must be avoided and Purdy himself says¹ that it does best in a heavy soil in California. In England it certainly succeeds in well-nourished sand, but my experience of its behaviour in this soil during the drought of 1911 seemed to show that a more retentive soil would suit it better.

Seed is set in abundance, if the flowers are artificially pollinated, and germinates readily.

⁺⁺*I. MACROSIPHON*²

(PLATE XII)

Torrey, Descr. Bot. Coll. p. 144 (in Pacific Rail. Rep. IV. 1857).

Baker in J. L. S. XVI. 138 (1877).

Hdk. Irid. p. 5 (1892).

Purdy in The Garden, Jan. 1st, 1898.

SYNONYMS.

I. chrysophylla, Howell, Flora of N. W. America, I. 633 (1897).

I have cultivated and flowered this plant for several years and cannot separate it as a species from *I. macrosiphon* Torrey, which is itself variable in size and colour. Of two specimens collected by Howell in the United States National Herbarium one has a six-inch stem while the other is practically stemless.

I. Douglasiana, Torrey, Bot. Whipple 144 (in Pacific Rail. Rep. IV. 1857).

This was probably *I. macrosiphon* for Torrey observes that the perianth tube was longer than in the original Douglasian specimens and moreover it was collected at Corte Madera, where *I. macrosiphon* is still common.

I. californica, Leichtlin, The Garden, Aug. 14th, 1897.

Purdy, The Garden, Jan. 1st, 1898.

Cf. also The Garden, Dec. 5th, 1896.

I have raised this from seeds sent by Purdy and cannot find in it anything but a large form of *I. macrosiphon*. Cf. Heller's specimens from Mt Sanhedrin (V) (B).

[N.B. Beechey's *I. humilis* (K) (cf. Hooker and Arnott, Voy. Beech. p. 160) is a dwarf form of *I. Douglasiana* and not *I. macrosiphon*, with which it has been identified.]

DISTRIBUTION. California and Oregon.

Purdy's statement (cf. The Garden, Jan. 1st, 1898) that *I. macrosiphon* "begins where *I. Douglasiana* leaves off" seems to be inaccurate, for the type specimens were collected "just across the bay from San Francisco," which would seem to mean Corte Madera and the slopes of Mt Tamalpais, where both the species grow. Moreover, I have it on the authority of Miss Alice Eastwood, the keeper of the San Francisco Herbarium, that both the species grow in this district.

Both these species have many colour forms and it is curious to find that these forms are more or less constant and occur in separate colonies, as is shown in the following extracts.

"At Ukiah and 120 miles south, only the lilac form (of *I. macrosiphon*) is found. Eight miles east, this suddenly gives way to the creamy form and then to the white variety and then to the purple. In a cañon a few miles from Ukiah, there is said to grow every conceivable colour variation from sky blue to yellow" (Purdy in The Garden, Jan. 1st, 1898).

"At the lowest levels on Mt Tamalpais, the white-flowered form of *I. Douglasiana* appeared. Further up it became blue and further still pinkish mauve. Everywhere on the great mountain it peeps out under the 'chaparral,' the name given to the various medley of shrubs, which clothe the vast mass of rock and leave no space bare even to the summit" (E. R. Bernard in The Garden, Aug. 5th, 1911).

Oregon. Douglas Co., 1881, Howell (B) (W).

Abbot's Butte on boundary between Douglas Co. and Jackson Co., 1898, Applegate (W).

Jackson Co., Ashland, 1886, Henderson (K).

Siskiyou Mts, 1898, Applegate (W).

Wimer, 1892, Hammond (W).

Western Cascade Mts, 1902, Cusick (V) (B).

California. Siskiyou Co., Marble Mt, 1901, Chandler (no. 1570) (W).

Mendocino Co., Ukiah, 1866, Bolander (K) (BM) (V) (W).

Round Valley, 1898, Chesnut (W).

Lake Co., Mt Sanhedrin, 1902, Heller (V) (B).

Between Lakeport and Hopland, 1903, Baker (K) (V).

Placer Co., Auburn, 1865, Bolander (no. 4529) (W).

Sonoma Co., Marsh Hot Springs near Santa Rosa, 1884, Holman (W).

Windsor, 1902, Heller and Brown (W).

Marin Co., Corte Madera, 1904, Heller (No. 7370) (W).

Sausalito Hills, 1869, Kellogg and Harford (W) (BM).

San Mateo Co., Pescadero Creek, 1903, Copeland (V).

¹ Cf. The Garden, Jan. 1st, 1898.

² From *μακρός* long and *σίφων* a tube.

The Apogon Section

Santa Clara Co., Mt Hamilton, 1900, Elmer (V).
 1895, Rutter (W).
 1907, Heller (B) (E).
 Gilroy, 1903, Baker (K) (V) (B) (W).
 Elmer (V) (B).

Bigelow's specimen (K) 1853-4 from near the 35th Parallel of latitude points to a southern extension of the habitat, if the somewhat loose indication of locality is strictly interpreted. But this specimen is probably from the same source as No. 1444 (W) from the Mexican Boundary Survey's plants collected "chiefly in the Valley of the Rio Grande below Donnana," and some confusion is doubtless involved here.

Diagnosis.

I. macrosiphon imberbis; *rhizoma* gracile; *folia* glaucescentia; *caulis* brevis, monocephalus, foliosus; *spathae* acuminatae, angustae, 2—3 florum; *pedicellus* brevissimus; *tubus* ovario triplo vel etiam multoties longior; *stigma* triangulare.

Description.

Rootstock, a slender, compact-growing rhizome.

Leaves, narrow, ensiform, acuminate, more or less glaucous, $\frac{1}{3}$ — $\frac{1}{2}$ by 10—12 in.

Stem, 2—4 in. sheathed in 1—2 narrow reduced leaves.

Spathae valves, narrow, $2\frac{1}{2}$ —4 in., green, sharply keeled, very narrow and acuminate, 2—3 flowered.

Pedicel, $\frac{1}{2}$ in.

Ovary, green, $\frac{1}{2}$ in.

Tube, $1\frac{1}{2}$ —3 in., varying in colour according to the colour of the flower; purple in the case of the purple forms.

Falls, broadly oblanceolate, tapering gradually to the broad haft. The colour varies from white through cream and pale yellow to lavender and purple. The veins are of a deeper colour.

Standards, lanceolate with wavy edges, slightly shorter than, and of a paler shade of the same colour as, the falls.

Styles, narrow, keeled, deeper in colour than the standards.

Crests, long, narrowly triangular.

Stigma, tongue-shaped.

Filaments, ciliate.

Anthers, yellow.

Pollen, yellow.

Capsule, over 1 in. long, trigonal with sharp angles, down each of which runs a groove, the sides flat or slightly convex, with a shallow groove down each. A sharp beak is formed at the upper end, which narrows more gradually than the somewhat truncated base.

Seeds, pyriform or oval, some flattened, light reddish brown with coarsely wrinkled coat.

Observations.

I. macrosiphon was appropriately named, for it is at once distinguishable from all the other known Californian Irises by its short stem and long perianth tube.

The liability of its flowers to vary in colour has already been mentioned under the heading of Distribution and is further illustrated by Plate XII. In the latter it will be noticed that the leaves of the two examples are not equally glaucous, a feature which is even more obvious when the plants are growing side by side.

For cultivation, see the general introduction to the Californian group (p. 35).

I. TENUISSIMA

DISTRIBUTION Shasta County, California.
 Near Pit River Ferry, Shasta Co., 1897, Brown, no. 239 (W).

Diagnosis.

I. tenuissima Apogon; *I. Purdyi* et *I. macrosiphon* affinis; ab hac tamen *caule* producto, *spathis* navicularibus, *segmentis* tenuissimis, ab illa *caule* manifesto nec omnino bracteis oblecto, *segmentis* tenuissimis differt.

Description.

Rootstock, a slender rhizome.

Leaves, few in number, linear, acuminate, 12—14 in. by $\frac{1}{4}$ in.

Stem, 12 in., unbranched, bearing 3 or 4 reduced leaves.

Spathes, 2-flowered, with navicular, acuminate, rigid valves, about 2 in. long.

Pedicel, under $\frac{1}{2}$ in.

Ovary, comparatively broad in the middle, but tapering at either end.

Tube, narrow, a little more than an inch in length.

Falls, very narrow, probably yellow, about $1\frac{1}{2}$ in. long.

Standards, very narrow, $1\frac{1}{2}$ in. long.

Styles, short and narrow.

Crests, linear, as long as the styles.



Observations.

I have only seen one herbarium sheet of this species containing five flowering stems and a tuft of leaves. It was impossible to say with certainty that the flowers were yellow, but this is probably their colour.

The species is easily distinguished by its extremely narrow segments. Its long tube brings it near to *I. Purdyi* and *I. macrosiphon*, but its stem is not concealed in bracts as is that of *I. Purdyi* (see Plate XI) and from *I. macrosiphon* it is separated by the longer stem, broader spathes and shorter tube.

IV. *The Syrian Group.*

This group consists of four Irises, which may be looked upon either as forms of one species or possibly as distinct species. The characteristic features are the extremely long and narrow 1-flowered spathe, the almost equally long pedicel and the rigid, sharp bristles that surround the rhizomes. If we accept the view that colour in an Iris flower is no good specific difference, we must group all the four plants under the one name of *I. Grant Duffii*.

† *I. GRANT DUFFII*

Baker, Handbook Irid. p. 7 (1892).

• Bot. Mag. t. 7604 (1898).

• Bull. Soc. Tosc. Ort. 1893, t. 7.

SUBSPECIES(?).

I. Aschersoni, *Foster in The Garden, 1902, I. p. 288.

I. melanosticta, Bornmüller in Gartenflora, 1907, p. 495.

I. masia, Foster in The Garden (as *I. Massiae*) l.c.

Dykes in Gard. Chron. 1910, I. pp. 99, 147.

DISTRIBUTION. Palestine and the South-Eastern districts of Asia Minor (see also the descriptions of the supposed subspecies in the Observations).

River Kishon, 1863-4, Lowne (K) (E).

Akka (Acre) and Batteef, 1887, Lee (Foster's MS.).

Esdraelon, 1888, Grant Duff (HortD from Foster).

Diagnosis.

I. Grant Duffii imberbis; *rhizoma* anulatum, spinosum; *folia* linearia, sesquipedalia, caulem uniflorum ter superantia; *pedicellus* longissimus, cauli et spatharum valvis linearibus viridibus subaequalis; *segmenta* exteriora leviter panduriformia.

Description.

Rootstock, hard, fibrous, somewhat annulate, the rings marking each season's growth, covered with fine bristles so sharp and rigid as to pierce the skin when the roots are handled. These bristles are the remains of withered leaves.

Leaves, linear, moderately firm, about a foot and a half in length, $\frac{1}{4}$ in. broad.

Stem, 1-headed, 6 in. long, bearing about 2 lanceolate sheathing leaves.

Spathe valves, 1-flowered, 4-7 in. long, narrowly lanceolate, acuminate, rigid, green.

Pedicel, 3-5 in. long.

Ovary, cylindrical or much rounded trigonal, becoming narrower above.

Tube, short, usually under $\frac{1}{2}$ in. long.

Falls. The slightly panduriform haft is veined with lilac or purple on a yellowish white ground and separated by a slight constriction from the obovate yellow blade, which is marked with an orange signal patch, $2\frac{1}{2}$ in. long by $\frac{1}{2}$ - $\frac{5}{8}$ in. wide at the broadest point of the blade.

Standards, oblanceolate unguiculate, yellow with lilac or purple dots and veins on the haft, 2 in. long by $\frac{1}{4}$ in. wide.

Styles, $1\frac{1}{4}$ in. long, becoming much broader in the upper part than at the base.

Crests, large, narrowly triangular, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, with coarsely serrate edge.

Stigma, bilobed.

Filaments, very short.

Anthers, large, three times as long as the filaments, $\frac{3}{4}$ in. long.

Pollen, pale yellow or buff.

Capsule, 4 in. long, trigonal with rounded angles and concave sides. The pale buff-coloured surface is finely ribbed and closely mottled with brown spots.

Seeds, globose, brown, wrinkled, with a somewhat tapering neck.

Observations.

This curious Iris is a very shy flowerer in England. In its native home it flowers in April in rich marshy soil, which is subsequently baked hard by the sun during the summer. Soon after the flowering season the leaves wither completely away and only reappear when the autumn rains have begun. In 1905 there were still growing in Foster's garden at Shelford some of the original

plants that General Grant Duff had given him in 1888. They had never once flowered nor have some roots that Foster gave me done any better. I believe, however, that some that he sent to the Cambridge Botanic Garden did flower there in a warm, dry position sheltered by the greenhouse walls.

Judging from what I have seen in the south of France, I incline to believe that this Iris will only succeed in a very warm position in heavy soil, where it is kept quite dry, either naturally or artificially, for at least four months in summer. The soil should be rich in lime, and the plant would probably be best suited in that heavy red marl that is found among the rocks in the limestone regions on the Mediterranean coast.

A curious point about this Iris is that seedlings by the end of their first season's growth have formed small bulb-like rootstocks, with reticulated coats almost, if not quite, indistinguishable from those of *I. reticulata*.

For examples of the seeds and capsules of this Iris, I am indebted to Herr Georg Egger of Jaffa.

In the present state of our knowledge it seems impossible to say whether or no we ought to consider as mere forms of *I. Grant Duffii* or as definite species three Irises which are either in commerce or else known to us from herbarium material, under the names of *I. Aschersoni*, *I. melanosticta*, *I. masia*.

I. Aschersoni was mentioned by Foster and illustrated in *The Garden*, 1902, i. p. 288, and stated to come from near Adana in Cilicia. The authority for the name is unknown, but the plants probably reached Foster from Sintenis through Max Leichtlin, or from Herr Siche of Mersina. At any rate the plant, as Foster knew it, is now in commerce and is certainly somewhat easier to flower than *Grant Duffii* itself¹. The actual flowers are of a somewhat greener yellow, and the falls are curiously fringed with irregular linear dark black purple dots. In some specimens a few larger linear blotches appear on the centre of the blade. The fibrous remains of old leaves on the rootstocks are perhaps slightly less rigid than those of *I. Grant Duffii*, but there appears to be no other difference. In cultivation it requires the same treatment as *I. Grant Duffii*.

I. melanosticta was described by Bornmüller in *Gartenflora*, 1907, p. 495, and was said to come from the Hauran on the east side of Jordan. The difference between it and *I. Grant Duffii* (no mention was made of *I. Aschersoni* with its edging of small blackish dots) was stated to consist in the colour, which is a purer yellow and in the presence of four or five large linear black dots scattered irregularly over the blade of the falls. This plant is also in commerce now, and would seem to be at most a mere colour form of *I. Grant Duffii*. There is a specimen in the Kew Herbarium obtained from the Hauran by Egger.

The last member of this group, which is also probably a mere colour form of *I. Grant Duffii*, comes from the neighbourhood of Süverek in the district of Diarbekr in Northern Mesopotamia. The first mention of it in botanical literature occurs in an article by Foster in *The Garden*, 1902, i. p. 288, as a purple-flowered relative of *I. Grant Duffii* named *I. Massiac*. No explanation was given of the name, nor was any full description of the plant known. In 1910 I found in the Kew Herbarium an unnamed Iris collected by Sintenis (no. 1219) (K) (B) (P), near Süverek in 1888, which I recognised as identical with the sketch and dried segments of *I. Massiac*, preserved in Foster's note-books. The explanation of the name became apparent, when Dr Stapf pointed out that Mons Masius was the ancient name of the Karadja Dag, on the slopes of which Süverek is situated. Moreover, I have subsequently found that the specimens in the Vienna and Paris collections bear the inscription "*I. Masia* sp. nov. Stapf." No description of the plant was published by Dr Stapf when he gave the name in 1888, but Sintenis' specimens and Foster's notes supplied the material for the account given in the *Gard. Chron.* 1910, i. pp. 99 and 147. In this case, also, Foster probably obtained the plants that flowered with him from Sintenis through Max Leichtlin.

V. The Chinese Group.

This is a somewhat arbitrary group of four Chinese and Japanese plants. They are very imperfectly known, and until they are all brought into cultivation and we become better acquainted with their characteristics, it seems more convenient to group them together on the basis of their geographical distribution rather than to assign them to other groups to which they may ultimately prove not to be nearly allied.

- | | |
|--|---------------------------|
| 1. Rhizome resembling that of <i>I. ensata</i> or <i>I. spuria</i> ; stems produced in pairs from the centre of a tuft of leaves; pedicels long, tube and ovary short. | <i>I. Grysi</i> (p. 47). |
| 2. Rhizome resembling that of <i>I. ruthenica</i> ; leaves narrow, grassy, pedicel short; tube four or six times as long as the ovary. | <i>I. Rossii</i> (p. 48). |
| 3. Rhizome very slender and wiry; pedicel short; tube about twice as long as the ovary. | <i>I. minuta</i> (p. 48). |
| 4. Rhizome very slender and wiry, similar to that of <i>I. minuta</i> ; pedicel long; tube short, equal to the ovary. | <i>I. Henryi</i> (p. 49). |

¹ This is probably only the case with freshly imported plants, which gradually lose their vigour and become flowerless except in very favourable conditions.

I. GRIJSI

Maximowicz in Bull. Acad. Péter. XXVI. (1880), p. 515.
Mélanges Biol. X. p. 702 (1880).

Hance in Journ. Bot. XX. (1882), p. 295.

Baker, Hdk. Irid. p. 6 (1892).

[*N.B. There exists at Kew a drawing of this Iris by a Chinese artist from Sir W. Hooker's collection. It is from this that the colour of the segments is described.]

SYNONYM.

I. Cavaleriei, Léveillé in Mem. Pontif. Accad. Rom. Nuov. Linc. XXIV. 1905, p. 18.

I. oxypetala, Bge., Hance in Journ. Bot. 1870, p. 314, ex parte, see Observations.

DISTRIBUTION. Central China in the provinces of Fukien, Anhwei, Hupeh, Shensi and Kweichow

Fukien. De Grijis (no. 8583) (K) (BM) (V). [This is Maximowicz's type.]

Anhwei. Wuhu, 1881, Bullock (BM) (E).

Hupeh. Wushan, 1900, Wilson (no. 661) (K) (E).

Shensi. Fuchow, 1897, Hb. Carles (no. 598) (E).

Kweichow. Kweiyang, 1900 (L). (N.B. This is Léveillé's type of *I. Cavaleriei*.)
1898, Chaffanjou et Bodinier (L).

Diagnosis.

I. Grijsi Apogon; *rhizoma* ut in *I. ensata* sed tenuior; *caules* plerumque bini ex eodem foliorum fasciculo producti, 4—6 poll. longi, monocephali; *pedicellus* longus; *tubus* brevis, ovario aequilongus.

Description.

Rootstock, a slender wide-creeping rhizome, clothed in the wiry remains of old leaves and resembling that of *I. ensata*.

Leaves, 6—14 in. by $\frac{3}{8}$ — $\frac{5}{8}$ in., linear-ensiform, stiff, finely but distinctly ribbed.

Stems, 4—6 in., bearing 1—3 reduced leaves, and usually produced in pairs from the same point, 1-headed.

Spathes, narrow, acuminate, 2—3 in. long, slightly scarious at the edge, 2—3-flowered.

Pedicel, $1\frac{1}{2}$ — $2\frac{1}{2}$ in.

Ovary, cylindrical at first, but swelling rapidly to an oval, with a distinct beak at either end.

Tube, short, about $\frac{1}{2}$ in.; in the dried state it is often difficult to see the division between the base of the tube and the beak of the ovary.

Falls. The lanceolate blade is faintly veined with pale red purple except round the end of the yellow central line where the veins spread out and the purple colour becomes more pronounced. The ground is white.

Standards, nearly white, faintly veined with pale reddish purple.

Styles, narrow, triangular.

Crests,

Stigma,

Filaments,

Anthers,

Pollen,

Capsule,

Seeds,

Observations.

This Iris in some ways resembles *I. ensata*, especially in the character of the rhizome. It is very variable in size, but is easily recognised by its curious habit of throwing up two stems side by side, clothed with much reduced leaves. The smallest specimen known is that described by Léveillé (l.c.) as *I. Cavaleriei*. Here only one stem had had time to develop, but the second can be distinguished in its immature state alongside it and the leaves that clothe these stems are those described by Léveillé as "interiora (folia) angustissima et brevissima." Bullock's specimens from Wuhu have both the stems fully developed side by side.

The ovary also is characteristic. It appears to swell very rapidly as the flower withers, and has a distinct beak. The base is not truncate, but narrows gradually to a distinct stump above the articulation at its junction with the pedicel, which is nearly as long as the spathe valves or even actually longer. Hance's description of the supposed capsule of this Iris in Journ. Bot. 1870, p. 314, is a mistake, for the description is certainly that of the capsule of *I. ensata*. Moreover, in the Kew Herbarium there is preserved a sheet from Dr Hance bearing plants of *I. Grijsi* and the capsules of *I. ensata*.

Nothing is known as to the cultivation of this species.

¹ Named after C. F. M. de Grijis, a Dutch military surgeon, who collected plants for Dr Hance near Amoy and in Fukien.

Filaments,

Anthers,

Pollen,

Capsule, short and broad.

Seeds,

Observations.

This small Iris, which has not yet been introduced into cultivation, appears to be very similar in habit and growth to *I. minuta*, from which, however, it is easily distinguished by its very short perianth tube and comparatively long pedicel.

Wilson's Western Hupeh specimens (no. 1841) are very small, but the old remains of leaves show traces of burning and, if the vegetation is often burnt, the plants would doubtless be weakened. They differ in no respect except in size from typical specimens.

VI. *The Scarlet-seeded Iris.*

The single character of the scarlet seeds would be almost enough of itself alone to separate *I. foetidissima* from all other species. It has, however, several other distinctive features, which will be found noted in the Observations.

†‡ *I. FOETIDISSIMA*

Linn. Sp. Plant. ed. 1. p. 39 (1753) (Specimen in Hb. L. S.).

• Plenck, Ic. t. 37 (1788).

• Red. Lil. t. 354 (1812).

• Rehb. Icon. Fl. Germ. t. CCCXLVII. fig. 775 (1847).

Baker in J. L. S. XVI. p. 141 (1877).

Hdk. Irid. p. 13 (1892).

Boiss, Fl. Or. v. p. 127 (1881).

• O'Brien and Parkinson, Wild Fl. Undercliff, t. 1 (1881).

Nyman, Consp. p. 702 (1882).

Richter, Pl. Eur. 1. p. 258 (1890).

Asch. and Graeb. Syn. III. p. 494 (1906).

SYNONYMS.

I. foetida, Thumb. Diss. Irid. p. 16 (1782).

Bergeret, Phyt. II. p. 185 (1784).

DISTRIBUTION. Western and Southern Europe and North Africa.

Great Britain. Dorset (Wimborne), 1879, Scott (K).

Isle of Wight, 1880, Fraser (B) (V).

Ventor, 1863, Gansauge (B).

Loch Leven, 1863, Gansauge (B).

Near River Wey above Godalming, 1907 (HortD).

France. Ile d'Albi (Tarn), 1885, Jordan de Puyfol (V).

St André de Cubzac, 1878, Jarris (V) (B) (BM).

Touraine, 1824, Hb. Hook (K).

Narbonne, 1846, Irat (E).

Cherbourg, 1862, Le Jolis (V).

Hyères, 1831, Hb. Braun (B).

St Saturnin (Puy de Dôme), 1878 (B).

Portugal. Coimbra, 18—, Motter (K).

1898, Ferreira (B).

Cintra, 1850, Ball (E).

Serra da Arrabida, 1882, Davean (C).

Spain. Madrid, 18—, Graebles (BM).

Casa del Campo (Madrid), 1841, Reuter (BM).

Grazalema, 1890, Reverchon (E).

Canary Isl. Palma, 1845, Bourgeau (C) (V) (K).

The Azores. 1868, Drouet (BM).

Italy. Venice, 1871, Porta (BM), 18—, Hb. Braun (B).

Pisa, 1860, Savi (K) (C).

Verona, 1905, Rigo (K) (E), 1878 (V).

1871, Porta (E).

Brescia, 1885, Porta (V).

Fiesole, 1892 (B).

Florence, 1880, Levier (B).

Corsica. Orezza, 1827, Soleirol (K).

Sardinia. Iglesias, 1828-29, Müller (K) (V) (E) (C) (B).

I. di Tavolara, 1885, Forsyth (E).

- Sicily.* Sicily, 18—, Parlatore (K).
 Palermo, 18—, Tineo (V).
 18—, Philippi (B).
 Le Madonie, 18—, Tineo (V).
Serbia. Belgrade, 1865, René du Parquet (BM).
North Africa. Algiers (Kouba), 1879, Gandoger (BM).
 Algiers, 1837, Bove (K) (B).
 1850, Jamin (K).
 18—, Charpentier (V).
 Tetuan (Beni Hosmar), 18—, Webb (B).

Diagnosis.

I. foetidissima Apogon; *folia* foetida, nitida, hieme viridia; *semina* flammea etiam in capsula dehiscente placenta adhaerent.

Description.

Rootstock, a somewhat slender, slow-growing rhizome.

Leaves, thick, evergreen of a somewhat dark shade, slightly glaucous at the base, ensiform, 12—18 in. long, $\frac{3}{4}$ —1 in. broad.

Stem, about 2 ft. long, bearing 2 or 3 reduced clasping leaves and 2 or 3 heads of flowers.

Spathes, 2—3 flowered; valves green, rigid, firm, lanceolate, about 3 in. long.

Pedicels, unequal in length, 1—3 in. long.

Ovary, trigonal with a groove at each angle and on each face, tapering slightly at either end.

Tube, about half an inch, rounded trigonal, separated by a constriction from the ovary.

Falls. The haft becomes gradually wider and is separated by a slight constriction from the obovate or nearly orbicular blade, which is slightly emarginate. The veining is always conspicuous in the purple-flowered form. The colour is either a pale grey-purple with deeper purple veins or a pale straw-yellow with greenish veins. $1\frac{1}{2}$ —2 in. long by $\frac{3}{4}$ in. broad.

Standards. The blade is emarginate and either oblanceolate or narrowly obovate, with a short canaliculate haft.

Styles, about an inch in length, growing suddenly wider in the upper part.

Crests, small, deltoid.

Stigma, bifid, with two pointed teeth.

Filaments, short.

Anthers, long, usually reaching the stigma or even projecting beyond it.

Pollen, cream.

Capsule, rounded trigonal, more or less distinctly six ribbed narrowing to a beaked point at the upper end, $1\frac{1}{2}$ —2 in. long.

Seeds, globular, scarlet, remaining firmly attached after the capsule has dehisced.

Observations.

This *Iris*, which derives its name from the disagreeable smell emitted by the bruised leaves, is very widely distributed and is one of our two native English *Irises*. The most common form bears flowers of a dull brownish purple but even in England a yellow form is found growing wild in Dorsetshire not far from Swanage and in the Isle of Wight. In this case the colour is a pale yellow tinged and veined with green. Another form is said to be finely veined with reddish brown on a dirty yellow ground. This latter may be that which is represented in Reich. Ic. Fl. Germ. t. CCCXLVII. fig. 775, but I have never seen any plant that had flowers in the least resembling this plate. The yellow-flowered form is also found in Sicily (cf. Tineo's specimen (V) from Le Madonie).

The flowers of this *Iris* are very inconspicuous except in the somewhat rare yellow-flowered forms and it is curious that no attempt to hybridise this species in order to produce an ornamental plant with evergreen leaves has ever been successful. Foster made many attempts but always without result.

The most conspicuous feature of this *Iris*, after its evergreen leaves, is formed by the open capsules displaying their orange-scarlet seeds throughout the winter. It is, as far as I know, the only *Iris* whose seeds remain attached to the placenta long after the capsules have burst. The seeds also are wholly unlike those of any other species, and form a very ornamental winter decoration.

A form with variegated leaves has long been known in gardens. It should be noticed that the pale yellow part of each leaf is towards the centre of the tuft, thus showing that it is really the outer edge of the leaf¹ that is unreachd by the green pigment.

The cultivation of this *Iris* presents no difficulty. It seems to have little preference in the matter of soil succeeding equally well in a limestone and in a limeless soil. It will grow in the shade of trees but does not flower freely unless it is in such a position that it gets a fair amount of sun. Seedlings grow very slowly and the whole plant is perhaps the most slow of increase of any *Iris*.

¹ *Iris* leaves are really closely folded down the centre, having their outer edges joined up except towards the base. The outer edges always turn towards the centre of the tuft of leaves.

VII. *I. ruthenica*.

This species seems to stand entirely alone. In its habit of growth it is unlike any other *Iris* and its curious seeds show that it is very distinct.

†‡ *I. RUTHENICA*

(PLATE XIII)

- *Ker-Gawler in Bot. Mag. t. 1123 (1808), t. 1393 (1811).
- Dryand. in Ait. Hort. Kew. ed. II. i. p. 117 (1810).
- *Géel, Sert. Bot. vol. I. (1830).
- *Reichenbach, Fl. Exot. p. 39 (1834).
- Ledebour, Fl. Ross. I. p. 55 (1842).
- Maxim. Prim. Fl. Amur. Suppl. pp. 477, 485 (1859).
- Hance in Journ. Bot. XIII. p. 139 (1875).
- Baker in J. L. S. XVI. p. 138 (1877).
- Hdk. Irid. p. 4 (1892).
- Baker and Moore in J. L. S. XVII. p. 387 (1879).
- Maxim. in Bull. Acad. Pét. XXVI. p. 516 (1880).
- Mélanges Biol. X. p. 704 (1880).
- Franchet, Plant. David. I. p. 297 (1884).
- Richter, Pl. Europ. I. p. 138 (1890).
- Allgem. Bot. Zeit. 1905, p. 157.

SYNONYMS.

- I. caespitosa*, Pallas ex Link, Jahrb. I. 3. p. 71 (1820).
- I. alpina*, Pallas ex Roem. und Schult. Syst. I. p. 476 (1817); cf. Pallas MS. on specimens from R. Yenisei and Lake Baikal (BM) and Gmel. Fl. Sib. I. p. 26, no. 26, t. 5, fig. 1 (1747).
- I. cristata*, *Somoku Zusetsu II. 6 (Japonice; Ko-kaki-tsubata).
- I. uniflora*, Pallas MS. ex Link, l.c. and Maxim. in Bull. Acad. Pét. XXVI. p. 517 (1880).
- I. nana*, Maxim. l.c. p. 705 (1880).
- Xiphion ruthenicum*, Alefeld in BZ. XXI. p. 297 (1863).
- Iomiris ruthenica*, Klatt in BZ. XXX. p. 502 (1872).
- Isis ruthenica*, Tratt. Auswahl Gartenpfl. t. 113 (1821).

DISTRIBUTION. Transylvania, the Altai region and thence eastwards into North China and Corea.

- Transylvania*. Klausenburg, 1835, Wolff (B).
- 1854, Wolff (B).
- 1868, Janka (K) (BM).
- Hermannstadt, 1850, Kotschy (B).
- 1851, Andra (B) (BM).
- Langenthal, 1904, Barth (E).
- 1881, Barth (B) (K).
- Roumania*. 1897, Loitlesberger (V).
- Altai Region*. Altai, 1833, Brandt (B).
- 1834, Meyer (B).
- 1839, Hb. Bunge (B).
- 1844, Richter (C).
- 1873, Shuttleworth (BM).
- 1881, Duhmberg (BM).
- Bijsk, 1898, Klementz (B) (V).
- Minussinsk; Kushabar, 1910, Price, no. 272 (K).
- South Altai; Marka Kul, 1876, Waldburg-Zeil (B).
- Turkestan*. Borborogussun, 1879, Regel (K) (BM) (B).
- R. Ili, 1878, Regel (V).
- Przewalsk to Karkara, 1896, Brotherus (B).
- Dschagartai, 1877, Regel (BM).
- Baikal Region*. Near Lake Baikal, 17—, Pallas (BM).
- Irkutsk, 18—, Schschukin (BM) (B).
- 1888, Karo (B).
- Dahuria*. 1829, Fischer (B).
- 18—, Ledebour (V).
- Amur Region*. Nertschinsk, 1889, Karo (B) (K) (E).
- Chita to Manchuria; along the railway, 1911, White Cooper (Dykes).
- Blagowjestschensk, 1898, Karo (K) (BM) (E) (V).
- Extreme East near Sachalien, 1905, Karo (K).
- China*. East Tibet, 19—, Forrest, no. 2818 (K).
- Szechuan; Batang, 1903, Soulié, no. 4072 (P).
- Tatsienlu, 1898, Mussot, no. 361 (P).
- Yunnan; East flank of Lichiang Range, 1910, Forrest, no. 5655 (E).
- Shansi; no locality, 1884, Potanin (K) (B).





- Chili; Pekin, 1888, Conolly (K) (E).
 1889, Bodinier (L).
 Jehol (Chengtsefu), 18—, David (BM).
 Manchuria; Mukden (Yalu River), 1886, Webster (K).
 No locality, 1905, Karo (BM).
 South East, 1860, Maximowicz (B) (BM).
 1896, Komarov (BM).
 North China, 1874, Bretschneider (BM).
Corca. Seoul, 18—, Gottsche (B).
 1902, Faurie (B).
 North Corea, 1897, Komarov (BM).

Diagnosis.

I. ruthenica Apogon; *rhizoma* gracile, dense caespitosum, fibris involutum; *folia* linearia, graminea; *scapus* simplex, foliis primum subaequalis denique multo brevior; *spatharum* valvae purpureo suffusae; *stigma* triangulare; *semina* appendice alba spongiosa instructa.

Description.

Rootstock, a slender, much branched rhizome, thickly covered with the hairy remains of old leaves.

Leaves, grassy, linear, with a glossy upper surface and slightly glaucous beneath, about 6 in. long by $\frac{1}{8}$ — $\frac{1}{4}$ in. or less broad, at flowering time, afterwards becoming twice as long.

Stem, from 1—8 in. long, usually bearing a reduced leaf and springing from a pair of reduced leaves at the base; 1-headed.

Spathes, 1—2 flowered; valves lanceolate, inflated, green with some pinkish-red colouration at the edges, 1— $1\frac{1}{2}$ in. long.

Pedice, $\frac{1}{4}$ —2 in. long.

Ovary, sharply trigonal, about $\frac{1}{4}$ in. long.

Tube, about $\frac{1}{2}$ —1 in. long, of a deep violet colour.

Falls. The broadly oval blade passes without any constriction into the wedge-shaped haft. The colouring consists of bright blue purple veins and dots on a creamy white ground, which becomes conspicuous on the lower part of the blade. The central ridge is slightly raised and tipped with violet. The haft often bears two curious notch-like projections near the base.

Standards, lanceolate with a narrow haft, deep purple violet.

Styles, slightly more red purple than the rest of the flower, becoming broader in the upper part.

Crests, overlapping, triangular, sometimes round, with serrate edge.

Stigma, a prominent, projecting triangle.

Filaments, mauve, attached comparatively high up on the falls.

Anthers, pale mauve.

Pollen, creamy.

Capsule, short, rounded, with scarcely any trace of ribs, but opening out rapidly when ripe and shedding its seeds. The walls are then very rigid and curl back in a characteristic way.

Seeds, globose, with a remarkable white excrescence at the point of attachment and extending some distance round the seed. This appendage shrivels and tends to disappear when the seeds fall from the capsule.

Observations.

This widely distributed Iris extends from Hungary to Eastern China and Corea, and has not unnaturally produced several local forms, which cannot be satisfactorily separated in herbarium specimens. Attempts have indeed been made (cf. Maxim. Bull. Acad. Pet. l.c.) to distinguish some of these forms under the names, either varietal or specific, of *brevituba*, *nana*, *typica*, but when we find that specimens from the same locality may have spathe valves that vary in length from $\frac{1}{2}$ in. to $1\frac{1}{4}$ in. (cf. Pekin, 1889, Bodinier (L)) or stems varying from 1 to 6 in. (cf. Tatsienlu, 1898, Mussot (P)), it seems at least undesirable to attempt any such division until we can get into cultivation a series of forms from known localities. Moreover, Maximowicz himself admits that both his *typica* and *brevituba* occur in the Altai district.

Unfortunately it is not an easy task to obtain wild specimens, for *I. ruthenica*, like most other Apogon Irises possessing slender rhizomes, is not an easy Iris to transplant and almost invariably arrives dead after a journey from Siberia or Central Asia. It is apparently very common along the Transsiberian Railway and I have known more than one instance where plants have been gathered growing close by the line at the various stopping places. Unfortunately none of them have survived. The best method is undoubtedly to obtain seeds and raise plants in this way. But here again there is a difficulty to be overcome, for *I. ruthenica* is one of the very few Irises, if not the only Iris, of which the capsule opens suddenly on ripening and so completely that all the seeds are at once scattered. In other species, the capsules dehisce gradually but some seeds at least remain at any rate until the stems collapse.

The species was originally brought into cultivation by means of seeds imported from Siberia by Conrad Loddiges in 1804. It was from one of these plants that the figure (1123) in the Botanical Magazine was prepared. Others were cultivated at Kew and quoted in Ait. Hort. Kew. l.c.

The seeds germinate readily and the young plants soon grow to flowering size. Cultivation is then not difficult in any light, fairly rich soil, which does not become too dry in summer, though well-established plants are able to resist even severe drought. If the plants must be moved, transplantation should take place while growth is active, either when it first begins in spring or immediately the flowers fade.

Some forms are undoubtedly much more floriferous than others and it seems to be a rule that those forms that produce the most slender leaves are also the least inclined to flower. The form figured has comparatively broad leaves and is extremely floriferous, for masses of flowers are produced as closely set as the two in the plate. As far as can be seen from herbarium specimens, this may well be an example of the Hungarian form.

I. ruthenica deserves to be far more widely grown than it appears to be and, as it seeds readily, there is no reason why colonies of it should not be started in sunny moist nooks in rock gardens. It might also be employed as an edging, though for this purpose it has the disadvantage that the foliage dies entirely away in winter.

This Iris has sometimes been confused with *I. humilis*, (MB). Klatt, for instance, in the Berlin Herbarium put examples of these two plants together under the name of *Neubeckia humilis* Alefeld (cf. *I. humilis* Observations, p. 69 for the difference between the two species).

Further confusion has been more recently caused in England by the fact that one well-known nurseryman has distributed this Iris under the name of *I. Purdyi*.

There appear to be two main forms of *I. ruthenica*; one (that illustrated at Plate XIII) has almost rigid leaves and flowers freely, while the other has flimsy, largely prostrate, foliage. It flowers only exceedingly rarely—at any rate, in the dry hot soil of Surrey, although in moister and richer conditions, it is said to flower well and even to produce a second crop of flowers in the autumn after flowering for the first time in April or May. It is unfortunately impossible to distinguish as herbarium specimens either these or any other of the forms of *I. ruthenica*, which have from time to time been described.

VIII. *I. unguicularis*.

This is another beardless Iris which seems to need a distinct subdivision for itself. It is distinguished from all other known species by the extremely long and slender perianth tube and by the curious processes which cover the style branches and give them the appearance of being sprinkled with gold dust. (See Observations.)

It is possible that the variety *lazica* is worthy of specific rank but, until our knowledge of this recent introduction into cultivation is more complete, it seems better to regard it merely as a distinct variety.

†*I. UNGUICULARIS*

(PLATE XIV)

Poir. Voy. Barb. II. p. 86 (1785).

*Bot. Mag. t. 5773 (1869).

Baker in J. L. S. XVI. p. 138 (1877).

Hdk. Irid. p. 3 (1892).

*Flora and Sylva, 1905, p. 131.

*Bull. Soc. Tosc. Ort. 1898, t. 1.

*Revue Hort. 1900, p. 300.

Var. *lazica*¹.

SYNONYMS.

I. lazica, Albow. Prodr. Fl. Colch. p. 232 (1895).

I. cretensis, var. *β latifolia*, Lipsky in Act. Hort. Tiflis, 1899, p. 460.

SYNONYMS.

I. stylosa, *Desf. Fl. Atlant. I. p. 40, t. 5 (1798).

Neubeckia stylosa, Alef. BZ. XXI. p. 297 (1863).

Ioniris stylosa, Klatt, BZ. XXX. p. 502 (1872).

I. stylosa var. *angustifolia*, Boiss. Diagn. Pl. Or. Ser. I. xiii. p. 15 (1853).

I. cretensis, Janka in OBZ. XVII. p. 376 (1867) and XVIII. p. 382 (1868).

Boiss. Fl. Or. v. p. 125 (1884).

Baker in J. L. S. XVI. p. 138 (1877).

Hdk. Irid. p. 3 (1892).

in *Bot. Mag. t. 6343 (1878).

I. cretica, Herbert MSS. (K) ex Baker, Hdk. Irid. 1c.

I. humilis, Sieber ex Baker in J. L. S. XVI. p. 138 (1877).

DISTRIBUTION. Algeria, Greece and the Islands of the Archipelago, Asia Minor and Northern Syria.

Algeria. Blidah, 1865, Paris (B) (BM).

1860, Lefebvre (V).

Kouba, 1879, Gandoger (B) (BM).

Bône, 18—, Dukerley (B).

Caroubiers (Bône), 1865, Tribout (C).

¹ The name was taken from Lazistan, the district in which it was found on the shores of the South Eastern corner of the Black Sea.



- Algiers, 1837, Bové (B).
 1839, Bové (V).
 1832, Schimper (K) (V).
 Bouzariat, 1840, Durien de Maisonneuve (B).
 Constantine, Djebel-el-Ouach, 1856, Choulette (BM) (B).
Greece. Attica, Mt Pentelicon, 1844, Heldreich (O) (B) (K) (E) (BM).
 Deceleia, 1882, Holzmann (B).
 Athens, 1843-44, Heldreich (E) (V).
 Cephissus, 1844, Heldreich (V).
 Euboea, Karystos and Stura, 1887, Oertzen (B).
 Kumi, 1862, 1864, Wourlich (B).
 Petalioi Isl., 1883, Munster (B).
 Aetolia, Missolonghi, 1879, Nieder (B).
 Moraea, Navarino, 1837, Hb. Knuth (B).
 Kalamata, 1896, Zahn (B) (K) (BM).
 Mt Voidias (Patras), 1861, Heldreich (B).
 Mt Taygetus, 1875 (B).
 Epidaurus, 1893, Heldreich (B).
 Malevo, 1857, Orphanides (K) (V) (B) (BM).
 Olympia, 1887, Weil (B).
 Argos, 1875 (B).
 Thessaly, Litochori, 1870, Krüger (B).
 Corfu, 1862, J. S. Mill (K).
 Cephalonia, 1907, Metaxa (HortD).
 Rhodes, 1875, Heldreich (C).
 1845, Heldreich (B) (V) (E).
 1854, Hedenburg (V).
 Crete, 1841, Sieber (B) (K) (V).
 Mt Lasithi, 1846, Heldreich (K).
 18—, Janka (V).
 Mt Cavoutsi, 1846, Heldreich (BM).
Asia Minor. Lycia, 1841, Forbes (K).
 Caria, 1843, Pinard (V) (BM).
 Smyrna, 1893, Whittall (K).
Northern Syria. Beilan, 1865, Haussknecht (B) (V).
 1893, Post (BM).
 Alexandretta, 1888, Sintenis (B) (V) (K).

Diagnosis.

I. unguicularis Apogon; *rhizoma* dense caespitosum; *folia* linearia; *caulis* raro manifestus; *spathae* membranaceae, tubo breviores; *tubus* filiformis, longissimus; *stylī* rami umbonibus minutis aureis sparsi; *filamenta et antherae* stylo leviter adhaerent.

Description.

Rootstock, a short compact rhizome with crowded tufts; the old root fibres become very tough and wiry.

Leaves, about six to a tuft, bright green, linear, firm, erect or drooping in the upper third, becoming 18—24 inches long or even longer by $\frac{1}{4}$ — $\frac{1}{2}$ in. broad.

Stem, usually undeveloped and very short but two or more flowers are produced in succession from the same part of the rhizome and between the same pair of clasping bract-like leaves; sometimes 1—3 in. long.

Spathe valves, linear, membranous, 4—6 in. long, scarious at the tip only, not reaching the top of the tube. The outer valve is usually distinctly keeled, and both shorter and greener than the inner.

Pedicel, very short, about an inch or less.

Ovary, about an inch, rounded trigonal or cylindrical.

Tube, 4—9 inches in length, slender, much rounded trigonal.

Falls. The cuneate haft expands more or less suddenly into a broadly obovate blade, of nearly the same length as the haft. At the base the haft is yellowish for about one inch, above which the yellow gives place on either side to a white ground with conspicuous purple veins. The yellow central band with three parallel veins is continued on to the blade, where it is flanked by patches of white or cream ground colour with conspicuous purple veins; beyond this area the blade becomes a uniform lavender purple with fine inconspicuous deeper veins. The white-flowered varieties have a central band of greenish yellow on the haft, which becomes orange on the blade.

Standards. For nearly an inch the haft is very canaliculate and then suddenly opens out and is of a reddish-brown colour or thickly veined with reddish brown on a yellowish ground. This colouration continues for an inch and the haft then suddenly expands into a broadly obovate blade of lavender or lilac.

Styles. The pale purplish styles are covered with curious processes which give them the appearance of being covered with gold dust. (See Observations.)

Crests, long, narrow, more or less deeply lacinated.

Stigma, small, oblong.

Filaments, slightly attached to the column formed by the concretion of the three branches, colourless or slightly greenish.

Anthers, large, white or cream, adherent to the style but not coherent with it.

Pollen, white.

Capsule, rounded trigonal with three deep depressions; the outline of the seeds is distinctly visible; the capsule does not ripen till late September or October.

Seeds, few in number, globose or compressed so as to be wedge-shaped, with a finely wrinkled surface.

Fragrance, very marked in a warm atmosphere.

Observations.

There seems to be no good reason for separating the Greek and Asia Minor forms of this Iris from the Algerian plant as distinct species. When Janka first described his *I. cretensis*, he was so intent on showing that it was not *I. humilis*—a plant from the Caucasus described by Bieberstein,—under which name Sieber had wrongly identified his specimens from Crete, that he altogether forgot to mention *I. unguicularis*. In any case he would probably have found it difficult to give any differentia beyond mere size by which to separate his *I. cretensis* from *I. unguicularis*. For indeed there is no other real difference, and even Algerian specimens have leaves varying from 1—2 ft. in length and from $\frac{1}{8}$ — $\frac{3}{8}$ in. in breadth. Attempts have been made to separate them on the ground that the spathes of *I. cretensis* are more scarious than those of *I. unguicularis*, whereas the truth is that the spathes of both are equally membranous and scarcely at all scarious. This is also the case with examples from Asia Minor (cf. Foster MS. in Hb. K.), from one of which the Bot. Mag. t. 6343 was prepared.

It is undoubtedly true that the Greek plant is usually smaller than the Algerian but the two agree in possessing so many characters that are peculiar to them among Irises that they cannot reasonably be separated. They have in common the leathery linear foliage, the long perianth tube and above all the curious processes on the style branches that occur nowhere else among Irises. To the naked eye this looks like gold dust scattered over the back of the style branches. Under the microscope, however, we see transparent spheres poised on the top of equally transparent blunt cones. At some point inside the sphere there is a mass of golden dust-like grains and it is to these masses that the colour is due.

As far as can be ascertained from herbarium specimens, the Asia Minor form of this Iris has even narrower and more grassy leaves than the Greek (cf. Forbes' Lycian and Whittall's Smyrna specimens (K)) and I have in cultivation such a form which may well be an Asiatic example. The leaves are certainly narrower, more erect and grass-like than the somewhat horizontal fan-like growth of some plants which were obtained for me from the island of Cephalonia. On the other hand such specimens as Zahn's from Kalamata (B) show that there is considerable variation among the Greek forms. It is curious that both the Greek and the Asia Minor plants agree in not coming into flower until March or April, whereas the Algerian type flowers during mild weather at any time between November and April. This might, however, have been deduced *a priori* from the difference in climate.

Attempts have been made to separate the eastern and western forms specifically on differences in the shape of the falls and in the amount of division in the style crests. It is, however, difficult to attach any great value to these supposed differences, for variation in both these points will be found among seedlings obtained by self-fertilising the typical Algerian *I. unguicularis*.

So far as my experience of the somewhat shy-flowering Eastern forms goes, the Greek plants more closely resemble the Algerian than do those from Asia Minor. The flowers of my plants from Cephalonia are practically identical with those of the Algerian type but only one-third as large. On the other hand, if a form of uncertain origin, sometimes to be obtained under the name of *I. agrostifolia*¹ may be taken to agree with herbarium specimens from Asia Minor, the flowers of the latter have more gradually expanding and more pointed fall blades. The white ground between the purple veins is much more visible on the blade and extends irregularly almost to the circumference, which is often edged with white. In such cases, the effect is strikingly delicate and attractive.

Much more real differences separate the variety *lazica* from all the other forms of the plant. Although it comes from almost the extreme Eastern end of the range of the species, whose leaves seem to diminish in width as we trace it from West to East, yet its foliage is broader and more distinctly ensiform—as opposed to linear—than that of any other form. Another point of real difference lies in the green spathe valves and in the much more sharply keeled outer valve. The tube, too, is not more than about 4 inches long. Moreover the stem is always produced to the length of 3—4 inches and it is not uncommon for the stems to be produced in pairs. If the var. *lazica* only differed from typical *I. unguicularis* in the production of a stem, we could hardly separate them, for Bot. Mag. t. 5773 and Tribout's specimen (C) from Caroubiers, Bône, show that other forms occasionally produce stems.

My own plants of *I. lazica* have not yet flowered and I owe the specimens that I have seen to the kindness of Mr C. G. van Tubergen of Haarlem. The colour was a dark purple and the veining on the blade was more conspicuous than that usually seen on Algerian plants. In this respect

¹ The authority for the name is apparently unknown.

lazica resembles Asia Minor forms much more closely, for in all the examples that I have seen the veining is continued over nearly the whole of the blade of the falls.

There are several garden varieties¹ of *I. unguicularis*, and these include more than one white form², of which some are certainly more floriferous than others. When the type is raised from seed, several slight variations in colour and markings occur and the various garden forms were probably obtained in this way.

There is, however, one very distinct form, known as *speciosa*. In my experience, this does not come into flower until March and its flowers have a fragrance quite distinct from that of the type and resembling that of the Sweet Pea. The foliage is dwarf, so that the flowers stand well above it. The blooms are of a deep reddish shade of purple and the peculiar ring of swellings where the bases of the segments of the flowers merge into the tube is not present, as far as I know, in any other form. It would be no surprise to find that this form is a local variety coming originally from Greece.

In a warm dry climate, the cultivation of *I. unguicularis* presents no difficulty. In spring and early summer growth should be encouraged by unstinted moisture and even weak liquid manure³. After midsummer, at the latest, the plants should be allowed to roast in the sun and it will usually be found that the more thorough this process is, the larger will be the crop of flowers in the ensuing season.

In obtaining this annual roasting, a position at the foot of a south wall is almost essential in England and if this south wall happens to be that of a greenhouse, with warm pipes on the inner side, the production of flowers will be less liable to cessation during frosty weather. In some rich damp soils, the growth of the plants is never ripened off in summer and, in such cases, the main hope of success lies in the construction of a raised bed against a south wall. The soil should be rendered light and porous by the plentiful addition of old mortar rubble. Sharp drainage is, of course, essential.

Following the rule that Irises should be transplanted, when root-growth is about to begin, it will be found that there are two seasons at which this is possible, namely in April or September. It is a mistake to break up large clumps, for small pieces seldom flower. With a judicious top dressing in spring of a little good soil or very old manure, it will be found that the plants can be grown for years in the same position without exhausting the soil within reach of the roots.

Seeds are freely produced in most seasons and germinate readily. The seedlings grow fairly rapidly and begin to flower in their third or fourth year. I am inclined to think that home-raised seedlings are often hardier than imported plants. At any rate the severe frosts of 1911 killed all the buds—and they were very numerous—on a number of plants from the south of France that had been established for more than a year. Not one flower subsequently developed and yet dissection of the shoots showed large numbers of immature buds destroyed by the frost. On the other hand, some home-raised seedlings, although they ceased flowering during the cold weather, subsequently threw up more blooms.

In frosty weather, the clumps should be protected from the early morning sun, whose rays falling on the frosted plants seem far more destructive than the frost itself.

I. unguicularis is well adapted for cultivation in large pots or pans. These should be sunk in the ground in some sheltered position during the spring and early summer and growth should be encouraged at that season by occasional waterings with weak liquid manure. From July onwards until about the end of September, the growths should be ripened by withholding excessive moisture and plants thus grown should flower abundantly, if brought into a cool house for the winter.

IX. The Spuria Group.

This well-marked group of Irises includes all those species or subspecies which have a two-toothed stigma and more or less trigonal capsules with a double ridge at each angle (see Fig. 5, p. 58). The seeds of all agree in the possession of a loose papery envelope, which varies considerably in colour in the various plants. This encloses a smooth light-brown seed of roughly cubical shape (see Plate XLVIII, fig. 10).

The flowers in many cases bear a striking resemblance to those of *I. xiphium*, and the falls are always more or less panduriform⁴. The stems are more or less completely sheathed in reduced leaves, while the lateral branches are held erect close to the main stem and do not project obliquely as in most other species. The consequence is that the inflorescence appears to be arranged in a single terminal spike with the flowers closely set one above the other on the stem (see Plates XV, XVI, XVII).

The forms and varieties are endless in number, and some of the larger are handsome garden plants, for the tall narrow foliage and graceful spikes of flowers are an ornament to any border.

¹ See The Garden, Sept. 15, 1894.

² See The Garden, p. 736, 1908. An account is there given of the first discovery of a single white-flowered plant in the Algerian scrub about 1878 by the Rev. Edwyn Arkwright.

³ This is only advisable because the plants do best in a poor gritty soil in England, though in their native homes they thrive in fertile clay.

⁴ The orbicular or oval blade is separated by a more or less narrow and constricted neck from the long oval haft.

The cultivation of all the members of this group is simple. They will grow in almost any soil from the heaviest clay to the lightest sand, but seem to prefer a sunny position in a rather stiff loam well enriched with humus. When once established, clumps should not be disturbed, but be liberally fed from autumn to early spring by mulching with leaf-mould or old, well-rotted manure. When growth becomes active in spring, the plants can absorb a large amount of moisture but seem to flower all the better in the following year if the rhizomes are well roasted by the sun in the late summer after the flowering season.

Transplantation and division are best effected soon after the flowers have faded, for then the growth of new roots from the rhizomes is active. At any later period these roots are apt to be broken and the plants suffer more or less from the effects of the winter and during the following season.

The plants are for the most part slow of increase, for comparatively few lateral buds develop on the rhizome. Most of the energy seems to be concentrated in the terminal shoot, and the rhizome consequently grows on from year to year in an approximately straight line.

Although the rhizomes are often an inch or more in diameter, their substance is rather fibrous than fleshy, and consequently, when out of the ground, they will not long resist drought. This makes the transference of plants over any great distance a matter of some difficulty, for it is almost impossible to ensure moisture and exclude decay during a journey lasting several weeks. I have repeatedly failed to revive rhizomes of various members of the *spuria* group which I have received from Asia in an absolutely dry condition, although rhizomes of *Pogoniris* have succeeded under identical treatment. This fact should be remembered when transplanting these Irises, and the rhizomes should not be allowed to remain out of the ground for any length of time or to become parched. It also points to the advisability of the use of seeds when it is desired to introduce into cultivation some wild form from the interior of Asia.



FIG. 5. Capsules of *I. spuria*.

Seeds germinate fairly readily, but the growth of the young plants is comparatively slow and, though some may flower in their second season,—in two years, that is, from the time when the seeds germinated,—yet the majority grow on for at least another year before the blooms appear.

For reasons which will presently be explained, it is probably impossible to apply the name of *I. spuria* to any particular plant. There can be little doubt that Linnaeus grouped together under the name a number of forms, which are more or less distinct from one another although they all bear a strongly marked family likeness. He describes the species¹ as a beardless Iris, with six-ribbed fruit, a round stem and nearly linear leaves, and an investigation of his authorities shows that he may have known, at any rate, the existence of the Spanish, French and Austrian forms. For instance, he quotes the *Hortus Cliffortianus*, p. 19, in which we get a reference to Clusius, *Hist.* i. p. 228. Clusius there mentions an Iris which he had found in 1563 growing near Oppenheim on the Rhine and near Mandersdorf, five miles from Vienna, and again later in 1579 near Lindwa in Hungary. On the other hand, Linnaeus introduces a reference to the Spanish and French forms by quoting C. Bauhin, *Pinax*, p. 32. The latter mentions both *I. angustifolia media*, Clus. *Hisp.* p. 286, and *angustifolia major*, Clus. *Hist.* i. p. 228. In his *History of Spanish Plants*, Clusius makes a point of distinguishing between the German plant, which he calls *angustifolia major* and the *angustifolia media*, which he had found growing in Spain near Valencia and also in Gallia Narbonensis.

In 1910 Bernatsky and Janchen (*OBZ.* p. 335) sought to differentiate the German and Austrian plant from the form that is found in the south of France. They stated that the former is of taller and more luxuriant growth, with short stem-leaves that expose the upper part of each internode. The latter they define as differing in its more slender growth and in its longer stem-leaves that cover almost the whole of the internodes and surpass them in length. To the latter they wished to give the name of *I. spathulata* Lamarck, while the former was named *I. subbarbata* by Joo (cf. *Verh. Siebenb. Ver. Naturw.* ii. (1851) p. 98) in reference to the pubescence which is visible even to the naked eye on a close examination of the central ridge on the falls².

The objections to this scheme are firstly that Lamarck (*Encycl.* iii. p. 300, 1789) gives Austria as well as the south of France as the habitat of his *I. spathulata*, and secondly that he has also a name *I. maritima*, borne by a specimen in his Herbarium at the Paris Jardin des Plantes which is almost

¹ *Spec. Plant.* ed. i. p. 39, no. 12 (1753).

² A microscopic examination of this pubescence shows it, however, to consist of unicellular processes, which are quite distinct in structure from the multicellular hairs of the beards of *Pogoniris*. Moreover, this pubescence is a marked feature of most forms of *I. spuria*.



certainly identical with the plant that now grows, and which I have myself collected, in the marshes between Hyères and the sea. Moreover, in a later work (Flor. Franç. ed. iii. (1805), p. 230) both *spathulata* and *maritima* are given as synonyms of *I. spuria*.

Recently, I have flowered a few specimens from Vias in the neighbourhood of Agde (Hérault), which proved not to agree with the Hyères plant but to possess short stem-leaves barely reaching more than two-thirds up each internode.

It is therefore impossible to say that one form exists in Austria and one in the south of France, for the Vias plant seems identical in all respects with the Austrian *subbarbata*. Moreover, the Spanish specimens, though they are as slender in their growth as is the Hyères form, have their stem-leaves only barely equal to the length of the internodes. In Algeria is found a form, which is apparently only a larger edition of the Spanish plant, while the Danish island of Saltholmen contains another very similar form. On the other hand, specimens from the neighbourhood of Rochefort (Char. infer.) are in some cases identical with the Hyères examples and in others as large again.

In this connection it should be remembered that the actual size is of little value as a criterion. So much depends on the weather and on the soil as well as on the position in which the plants have grown. As an example of this, I may point out that the seeds produced by a certain form of *I. spuria* from Kashmir were only half the size in the dry year 1911 that they had been in the wet season of 1910.

If the European forms of *I. spuria* are difficult to distinguish, those found in Asia are still more puzzling. How, for instance, are we to account for the fact that the Iris which Dr Fomin described under the name of *I. Carthaliniæ*¹ as growing wild in the Caucasus region at Mzchet and in the district of Gori in the province of Tiflis is also common in the neighbourhood of Srinagar in Kashmir? We must remember that several agencies may have been at work in the dissemination of these Irises. In the first place they are almost certainly self-fertilised and produce large quantities of fertile seeds, which moreover imprison sufficient air inside their loose parchment-like outer coat to enable them to float in water. In the second place, the fact that even in such remote regions as Kumul in Mongolia Irises are cultivated in the Khan's palace gardens² seems to show that the hand of man may not have been without its influence on the present distribution of Irises in Asia.

Following a plan which seems on the whole the best adapted to the circumstances, we must be content to define *I. spuria* rather as the abstraction of the common qualities of a number of local forms than as an individual plant. It will then be differentiated as follows:—Outer segments beardless but often pubescent, panduriform, the constriction between the haft and the blade being more or less narrow; leaves rigid, thick, ribbed, linear-ensiform, emitting a slightly foetid odour when bruised; stem round or very slightly compressed, bearing when in full vigour one or more lateral spicate heads besides the terminal head of two flowers; spathes broadly lanceolate, green; capsule with a double ridge at each angle and a gradually tapering neck³; seeds with a loose, papery, outer skin.

The most striking feature is the shape of the ovary (see Fig. 5, p. 58), which at once distinguishes any form of *spuria* from all other species except *I. graminea*, *I. humilis*, *I. Sintenisii* and *I. Kerneriana* among European and Asiatic plants and three American species of very different habit, viz.:—*I. fulva*, *I. hexagona* and *I. foliosa*. The latter with their flowers set in the axils of the leaves can be separated at once but the four European and Asiatic species are much more easily confused. They may be separated as follows:—

1.	{	Stem not produced.	<i>I. humilis</i> (p. 68).
		Stem produced.	1.
1.	{	Stem producing one or more lateral heads of flowers.	<i>I. spuria</i> (pp. 59—65, where an account of the various subspecies will be found).
		Stem only producing a single terminal head of flowers.	2.
2.	{	Stem flattened with distinct lateral flanges.	<i>I. graminea</i> (p. 65).
		Stem round or very slightly flattened.	3.
3.	{	Spathe valves sharply keeled.	<i>I. Sintenisii</i> (p. 61).
		Spathe valves rounded, not sharply keeled.	<i>I. Kerneriana</i> ⁴ (p. 70).

FORMS OF *I. SPURIA*

1. † *I. spuria* var. *maritima*.

(Plate XVII β, the Hyères form of *I. spuria*.)

SYNONYM.

I. maritima, Lamarck, Flor. Fr. ed. i. p. 497 (1795).

¹ Fomin in Monit. Jard. Bot. Tiflis, 1909, no. 14, p. 44.

² See Douglas Carruthers in The Geographical Journal, xxxix. no. 6 (1912), p. 541.

³ One of the difficulties encountered in trying to identify the various *spuria* Irises that have been described lies in the fact that some authors seem to have confused the tapering neck of the ovary with the short thick perianth tube, into which the neck expands.

⁴ I have only seen herbarium specimens of this species and it is not always easy to see from these whether the spathes are sharply keeled. The foliage of *I. Kerneriana* is probably also more flimsy and grass-like.

DISTRIBUTION. North Africa.

- Algiers, 1837, Bové (K) (C) [Klatt's description was based on Bové's specimens]
 1873, Joad (K).
 Constantine, 1873, Joad (K).
 Blidah, 1862, Lefebvre (K) (V).
 Mitidja, 1844, Munby (K).
 1856, Durando (C).

I 7. *I. spuria* var. *danica*.

On the Danish island of Saltholmen there occurs a variety of *I. spuria* which seems very nearly allied to, if not actually identical with, the Algerian form.

- Saltholmen, 1860, Lange (C).
 1874, Benzon (E).
 1893, Roth (E).
 1893, Simmons (V) (E).

II. *I. spuria* var. *subbarbata*.

SYNONYM.

I. subbarbata, Joo in Verh. Siebenb. Ver. Naturw. II. p. 98 (1851).

This is a stronger and more vigorous plant than any of the preceding. It is distinguished by the short stem-leaves which are not nearly as long as the internodes, which therefore remain largely exposed. The pubescence on the falls, in reference to which the name was given, consists of unicellular processes and is a feature by no means uncommon among members of the *spuria* group. It is found also on many other Apogon Irises.

DISTRIBUTION. Southern Germany, Austria, Hungary, Servia.

- Germany. Mainz, 1816, Ziz (K).
 1884, Sennholz (V).
 Austria. Vienna (Munchendorf), 1878, Braun (V).
 1893, Krebs (E).
 In marshes by the Danube, 1838, Lang (K).
 Hungary. Tokay, 1858, Krzisch (V).
 Gran, 1861, Pittoni (V).
 Hermannstadt, 18—, Schur (V).
 Koros Ladány, 1858, Borbas (B) (O).
 1886, Borbas (V).
 1892, Borbas (K) (BM).
 Buda, 18—, Lang (C).
 Servia. Nis, 1896, Adamovic (V).

III. *Plants from the Caucasus and Persia.*

In spite of many attempts it seems impossible in the present state of our knowledge to classify the various forms of *I. spuria* that are found in the Caucasus and in Persia. The European forms seem to fall naturally into certain geographical classes and at the extreme eastern end of the habitat, the Altai and Turkestan plants can be grouped together under the name of *I. halophila* Pallas, but in the centre confusion reigns supreme. There seems no hope of clearing up the difficulties here involved until we can obtain in cultivation a series of plants from known localities in the Caucasus region and in Persia. To this end seeds would be most welcome and it might eventually be possible to arrive at some satisfactory arrangement of this very difficult group of Irises¹.

Bieberstein's name *I. notha* was given to a Caucasus plant but it is impossible to discover what the author really took for his type. For, in the first place, the original description was apparently drawn up for a book that was never published (Bieb. Cent. Plant. Rar. Ross. II. t. 77). Of this work only the first part containing 50 plates is known and yet Bieberstein himself quotes the second part in his account of *I. notha* in Fl. Taur. Cauc. III. p. 45 (1819). If we had Bieberstein's plate before us, we could probably identify it with collected specimens from some region in the Caucasus, but without it we do not derive much assistance from his statement that *I. notha* differs from *I. spuria*, *ochroleuca* and *Guldenstadtiana* by its larger spathes and by the fact that the blade of the fall extends horizontally.

A few instances will suffice to show the difficulties of the questions here involved. A specimen (V) gathered by Parreyss near the river Alma in the Crimea has very long (6 in.) acuminate spathes and long stem-leaves, while another specimen found by the same collector (Tauria, 499 (V)) at no great distance away has much shorter and broader spathes.

Kotschy's no. 220 (Everek near Mt Argæus (Cappadocia), 1859 (V)) is interesting because, as far as can be seen from an herbarium specimen, it is identical with a fine form of *I. spuria*, which I received from Srinagar in Kashmir. In cultivation this latter plant grows to a height of from 3—4 feet and is that illustrated on Plate XV. The exact shade of colour in the flowers is apt to vary, for some specimens are of a lighter blue than that from which the illustration was taken.

¹ Even if a large series of plants from definite localities could be obtained, any attempt to work out the distribution of the various forms would have to take into consideration the possibility, already suggested at p. 59, that in the course of ages these Irises have been carried hither and thither by human agency and become practically cultivated plants.

Foster raised similar plants from seed collected by Aitchison¹ in 1891 between Murree and the Kashmir border, where it was growing with *I. ensata*. It might at first sight be taken as proved that this form is a native of Kashmir, but some doubt is suggested when we remember that the common Kashmir form of *I. germanica* is identical with that obtained by Foster from Kharput in Asia Minor and that Kashmir contains other Western Asian plants, which seem to have been introduced into India by the natural and only gateway from the west.

Further confusion as to this *Iris* is introduced by the description of a plant, which grows at Mzchet and in the Gori district near Tiflis in the Caucasus, under the name of *I. Carthaginae* Fomin (Monit. Jard. Bot. Tiflis, 1909, no. 14, p. 44), for I have been unable to separate it from the above-mentioned Kashmir plant.

Kotschy's *I. daenensis* (Kuh-Daena, S. Persia, 1842 (K) (BM) (C) (B) (V)) has short spathes and short broad leaves, and is apparently similar to plants from Askabad (1900, Sintenis (V) (E)).

IV ¹/₂ *I. spuria* var. *halophila*.

SYNONYMS.

- **I. halophila*, Pallas, Reise III. p. 713, t. B, fig. 2 (1773).
- I. Guldenstadiana*, Lepechin in Act. Hort. Petr. v. i. p. 292 (1781).
- I. sogdiana*, Bunge in Mém. Sav. Etr. Pétersb. VII. p. 507 (1847).

[This is said to differ in the shape of the pedicels but these are found both triangular and round in section on the same plant.]

- **I. stenogyna*, Delar. in Red. Lil. VI. t. 310 (1812).
- **I. desertorum*, Ker in Bot. Mag. t. 1514 (1812).
- I. musuluwanica*, Fomin in Monit. Jard. Bot. Tiflis, 1909, no. 14, p. 46.

[Dr Fomin tells me that this *Iris* is very common in salt marshes in South Eastern Transcaucasia. In his original description he admits that he had seen no specimens of *halophila* but separates the two plants by reason of the supposed difference of the length of the perianth tube. The truth seems to be that, in the original description of *halophila*, the long neck of the ovary was mistaken for the tube, which is really short and broad.]

DISTRIBUTION. Asia: from the Caucasus through Persia, the Altai and Tarbagatai districts to Afghanistan and the North West Frontier of India

- Persia*. Desgird, 1868, Haussknecht (BM).
- Shiraz to Ispahan, 18—, Aucher-Eloy, no. 5346 (K).
- Altai and Turkestan*. River Boroohudsir, 1878, Fetissow (BM) (E) (V) (K).
- Altai, 18—, Fischer (BM) (V).
- Karatau, 1876, Regel (BM) (V).
- L. Saisang-Nor, 17—, Pallas (BM) (K).
- R. Lepsa, 1841, Karelin and Kirilloff (BM) (V).
- Tarbagati Mts, 1840, Karelin and Kirilloff (BM) (V) (K).
- R. Irtysh (Jamyschewsk), 177—, Pallas (BM).
- L. Issy-Kul, 18—, Semenov (BM) (K).
- R. Ajagus, 18—, Schrenk (K).
- Tschilik, 1886, Krassnow (K).
- Indian Frontier*. Kurrum Valley; Shalizan, 1879, Aitchison (BM) (K).
- Afghanistan, 1883, Aitchison, no. 683 (K).

Observations.

Halophila is distinguished from the western forms of *I. spuria* by its relatively shorter stem, by the very narrow segments and by the small, horizontal blade of the fall.

The colour of the flowers is variable and may be either white, veined with yellow, a dull yellow or some shade of grey-purple. Some of the white flowered specimens are desirable but the others are hardly worth growing as garden plants.

There is no doubt that forms of this *Iris* are widely distributed in Central Asia between Persia, Turkestan and the North West Frontier of India. (Cf. Aitchison's specimens (BM) from Shalizan in the Kurrum Valley, which had white flowers with "a slightly primrose yellow tinge.")

Bunge's name *I. sogdiana* is of little importance because he relies only on colour and on the shape of the pedicels to separate his plants from typical *halophila*. Mere colour, however, can scarcely form the basis of a species and pedicels both round and triangular in section are often found on the same plant.

Ker's *I. desertorum* *Bot. Mag. t. 1514 is merely a lavender form of this *Iris* and the name is presumably taken from the manuscript name on one of Pallas' specimens (BM).

This *Iris* is one of the most vigorous of all the forms of *I. spuria*. The plants quickly grow into close masses of foliage from which emerge numerous stems. The individual flowers are small but they are produced so freely that the whole effect is ornamental. Cultivation is extremely easy, for the plants seem to succeed in any soil. Moreover, the flowers are self-fertilised and seed is produced in abundance. It germinates readily and *halophila* is one of the greatest offenders in Botanical Gardens, where its vigorous self-sown seedlings oust the original occupants of the beds and then in their turn provide seeds which are distributed under the names of the plants whose positions they have occupied.

¹ Cf. also the following Kashmir specimens:—Ramoo 6000 ft. 1876, Clarke, no. 28516 (K), Bijbahara, 1900, Duthie, no. 25825 (K), Gandarbal, 1901, Duthie, no. 25827 (K) (E) (B).

V. The three following subspecies *ochroleuca*, *Monnieri* and *aurea* are little more than varieties of *I. spuria*.

α. + *I. OCHROLEUCA*

- Linn. Mant. II. p. 175 (1771).
- *Curt. Bot. Mag. t. 61 (1788).
- *Red. Lil. t. 350 (1812).
- *Tratt. Auswahl, no. 89 (1821).
- *Reichb. Ic. Crit. x. t. 958 (f. 1289) (1831).
- Boiss. Fl. Orient. v. 129 (1884).
- Baker, Journ. L. S. XVI. 141 (1877).
- *Le Jardin, 1907, p. 200.

SYNONYMS.

- I. orientalis*, Miller, Gard. Dict. ed. VI. no. 9 (1768) ex parte, non Thunb.; Icones, t. 154.
Baker, Hdk. Irid. p. 16 (1892).
- I. gigantea*, Carrière, Revue Hort. 1875, p. 356.

DISTRIBUTION. Probably a native of Western Asia Minor.

- West of Smyrna, 1854, Balansa (V) (BM).
- Phrygia, 1901, Warburg (B).

Description.

Rootstock, a hard, compact rhizome.

Leaves, ensiform, 2—3 ft. long, an inch or more broad, rigid, dark green, slightly glaucous. They grow with a characteristic spiral twist.

Stem, 3 ft. long, slightly flattened, bearing 2—3 reduced leaves and 1—2 sessile lateral clusters besides the terminal head.

Spathes, 2—3 flowered; valves 4—6 in. long, green, lanceolate, acuminate, an inch broad.

*Pedice*l, 1—3 in. long.

Ovary, 1 in. long, 6-ribbed with 3 deep and 3 shallow grooves, with a 1 in. hexagonal neck.

Tube, proper—as distinct from the neck of the ovary—is funnel-shaped under $\frac{1}{2}$ in. long.

Falls; with narrow haft $1\frac{1}{2}$ —2 in. long, and broad ($1\frac{1}{2}$ — $1\frac{3}{4}$ in.) orbicular blade, white, flushed with yellow at the centre, deeply and widely emarginate, reflexed at a right angle and not spreading as in *Guldenstadtiana* and *notha*.

Standards, rounded cuneate, $3\frac{1}{2}$ in. long, deeply and widely emarginate.

Styles, nearly 2 in. with parallel sides.

Crests, triangular, over half an inch long.

Stigma, bilobed.

Filaments, pale yellow, slightly shorter than the anthers.

Anthers, long, of a pale buff colour.

Pollen, orange, abundant, almost transparent, of a narrow pointed oval shape; the extine is divided down one side by a narrow fissure.

Capsule, oblong, 2 in. long, more or less rostrate with three conspicuous longitudinal ridges, each of which is double; the ripe capsule dehisces along the middle line of these ridges.

Seeds, flattened or wedge-shaped with loose, white, semi-transparent, wrinkled coats (Plate XLVIII, fig. 10).

Observations.

Miller's name of *I. orientalis* can hardly be retained for this Iris because it is based on some confusion. His figure is indeed exactly *I. ochroleuca* except for the curious transversely spreading beard. His description, moreover, contains the words *corollis barbatis* and, though the members of this group often bear a kind of microscopic pubescence along the centre of the haft and of the blade of the falls, yet, as has been already explained at p. 13, the processes are unicellular and quite different from the multicellular hairs of Pogoniris beards. Our suspicions are further aroused by the fact that Miller states that his plants were raised from seeds brought from Carniola by Dr Pococke, a Bishop of Ossory. As however no such Iris is known in Carniola (see Scopoli, Fl. Carniol.) nor has ever been collected there, there seems little doubt that Miller's plant is based on some confusion.

The retention of the Linnaean name has the additional advantage that it allows Thunberg's name, *I. orientalis*, to be kept for the eastern relative of *I. sibirica* (see p. 23).

I. ochroleuca is well known in gardens and is a fine stately plant. Seedlings show considerable variation in the shape and poise of the segments and in the proportion of yellow and white in the colouring but no purple forms of it appear to be known. It is probably a native of swampy ground in western Asia Minor. Foster received plants from such a locality in the neighbourhood of Ephesus, and Balansa's specimens from west of Smyrna appear to be identical. Cultivation is easy and is that of the other members of the *spuria* group (see p. 58).

β. + I. MONNIERI

- DC. in Red. Lil. t. 236 (1808), non Sieber, nec Boissier nec Halácsy.
- Tratt. Auswahl, no. 90 (1821).
- Klatt in Linnaea, XXXIV. p. 619 (1866).
- Baker in Gard. Chron. 1876, II. p. 584.
- Hdk. Irid. p. 15 (1892).
- Asch. and Graeb. Syn. Mit. Fl. III. p. 492 (1906).

SYNONYMS.

- Xiphon Monnieri*, Alef. in BZ. 1863, p. 297.
- Xyridion Monnieri*, Klatt in BZ. 1872, p. 500.

DISTRIBUTION. Unknown.

Description.

- Rootstock*, a hard, compact rhizome.
- Leaves*, ensiform, 3 ft. long by 1—1½ in. wide.
- Stem*, 3—4 ft. long, bearing several reduced leaves, a terminal head of 2—3 flowers and one or more lateral clusters of flowers.
- Spathe*, 2—3 flowered; valves 4—6 in. long, 1 in. broad, firm, green, lanceolate; the bud in the spathes has a flattened appearance.
- Pedice*, 1—1½ in. long, trigonal in section, becoming 4 in. long eventually.
- Ovary*, 1 in. long, 6-ribbed, with 3 deep and 3 shallow grooves, and a long neck.
- Tube*, broad, under ½ in. long.
- Falls*, with orbicular, 1½ in. broad, emarginate blade rather longer than the haft, which is 1½ in. long; concolor, bright yellow.
- Standards*, oblong cuneate, 3 in. long, 1 in. broad, with a deep indentation at the apex; concolor, bright yellow.
- Styles*, over 1½ in. long, increasing in width towards the upper end.
- Crests*, small, deltoid.
- Stigma*, bilobed, with pointed, tongue-like tips.
- Filaments*, yellow, almost transparent.
- Anthers*, pale yellow, longer than the filaments.
- Pollen*. The grains are yellow, almost transparent, of a rounded oval shape. The extine is divided along one side by a narrow fissure.
- Capsule*, 2 in. long, rostrate, with 3 longitudinal ridges, each of which is double.
- Seeds*, irregular, with a loose papery shiny skin, which is either of a white, pink or brown colour.

Observations.

This Iris was so named because it was found growing in the garden of a M. Lemonnier at Versailles (cf. Red. Lil. t. 236). It was there known as "Iris de Rhodes" but was admittedly of uncertain origin.

The frequently repeated statement (Ascherson and Graebner, l.c., Boissier, Fl. Or. v. 130, Halácsy, Consp. Fl. Graec. III. 188, 1904) that this plant is a native of Crete rests on Sieber's erroneous identification of some specimens of *I. Pseudacorus* L. collected by him in 1821 at Niochorio on Suda Bay, Crete. These specimens are widely distributed and are found in the principal Herbaria (K) (V) (BM). Moreover Heldreich also collected *I. pseudacorus* on the hills above Suda Bay.

The Iris which is now in cultivation under this name is apparently that represented by Redouté. It is probably not a good species but a sport or variety of some form of *I. spuria*. This is proved by the evidence of seedlings raised from self-fertilised seeds. Among these *I. Monnieri* is probably the variety which least commonly appears, the majority approaching *I. ochroleuca* (cf. Foster in The Garden, 1890, p. 463).

The supposition that *I. Monnieri* is only a form of *I. spuria* is supported by the fact that it is readily fertile to the pollen of the latter. The plants thus raised by Foster are known as *I. Monspur* and are merely fine forms of *I. spuria* with flowers of some shade of blue-purple (see The Garden, 1890, p. 462, pl. 779). They are not unlike the Kashmir form of *I. spuria* illustrated in Plate XV.

I. Monnieri is distinguished from *I. ochroleuca* by being wholly of a lemon-yellow colour and from *I. aurea* (see Plate XVI) by the colour and by the fact that the blade of the fall is orbicular instead of oblong and has not the frilled edges of *I. aurea*.

Within recent years Siehe of Mersina claims to have found *I. Monnieri* growing wild in moist spots on the plain of Cilicia near Mersina and Misis, but the specimens (E) that I have seen have differently shaped segments and are of a much deeper golden colour.

The cultivation of *I. Monnieri* is the same as that of the other members of the *spuria* group. (See p. 58.)



81
Iris

γ. †*I. AUREA*

(PLATE XVI)

*Lindley, Bot. Reg. XXXII. (1847), t. 59, non Link.

Baker in Gard. Chron. 1876, II. 584.

Hdk. Irid. 15 (1892).

in Hook. f. Fl. Brit. Ind. VI. 273 (1894).

Stapf in OBZ. 1887, 419.

*Foster in The Garden, 1887, p. 52, t. 579.

SYNONYMS.

I. crocea, Jacquemont, MS. in Hb. K and B.

Cf. Baker in Gard. Chron. l.c.

Xyridion aureum, Klatt in BZ. XXX. (1872), 501.

DISTRIBUTION. From herbarium specimens this plant would appear to be a native of Kashmir, whence it was first introduced into Europe by Dr Royle by means of seeds from which Lindley's type was raised by Messrs Whittley and Osborne of Fulham. (Cf. Lindley, Bot. Reg. l.c.) It is, however, worthy of notice that in 1885 Foster received from Amasia a plant of which the flowers were of a golden yellow colour with frilled edges to the segments. It is just possible that *I. aurea* may be a form of *I. spuria* which has become naturalised in Kashmir. No herbarium specimens are known from any other country.

Choupionne, 1841, Jacquemont (K) (B).

Mudegaum, 1847, Winterbottom, 387 (K).

Mahgan, 1894, Aitchison, 23 (K).

Srinagar, 1901, Duthie, 25826 (K) (E) (B).

1905, Meebold (B).

1908, Harrison (HortD).

Description.

Rootstock, a hard and compact rather than fleshy rhizome.*Leaves*, ensiform, firm, 2—3 ft. long by about an inch broad, dying down completely in winter.*Stem*, 3 ft. or more long bearing a terminal cluster and 1 or 2 sessile lateral clusters.*Spathes*, 2—3 flowered, 3—4 in. long; valves narrow, stiff, green, lanceolate.*Pedicel*, 1½—3 in.*Ovary*, gradually tapering to tube.*Tube*, ½ in. long, broad.

Falls, haft 1½ in. long, ⅝ in. broad in the middle, narrowing both at the base and also slightly at the junction with the oblong, 2 in. long, emarginate, much crimped blade. The colour is a rich golden yellow of a much deeper shade than in *I. Monnieri*.

Standards, oblong, with cuneate haft, emarginate, ¾ in. broad by 3 in. long, with much waved edges.*Styles*, 1½ in. long, becoming slightly wider in the upper part.*Crests*, deltoid.*Stigma*, two sharply pointed, tongue-like, projections.*Filaments*, deep yellow, rather shorter than the anthers.*Anthers*, deep yellow, long and narrow.

Pollen, deep yellow, almost transparent, of a narrow oval shape; the extine is divided down one side by a narrow fissure.

Capsule, oblong, more or less rostrate, with three conspicuous longitudinal ridges each of which is double.

Seeds, pale buff, compressed into thick discs and covered with loose, wrinkled, white, grey, pink, or sometimes black coats.

Observations.

This fine Iris is one of the latest to flower, usually opening its first blooms in the latter half of June. It is not difficult to grow and its cultivation is that of the other members of the *spuria* group. (See p. 58.)

It is still found growing apparently in the wild state in the neighbourhood of Srinagar in Kashmir, from which locality I have received living rhizomes along with the pale and deep purple forms of *I. spuria* of which the latter is illustrated at Plate XV.

Apparently *I. aurea* does not come true from seeds, but, as I am not yet in a position either to corroborate or to deny this statement, it seemed preferable to keep up a name which is in very general use, always remembering that it most probably represents a plant, which is at most a subspecies and not impossibly a mere seedling variety of a large form of *I. spuria*.

††*I. GRAMINEA*

Linn. Spec. Pl. ed. 1, p. 39 (1753).

*Jacq. Fl. Austr. I. t. 2 (1773).

*Bot. Mag. t. 681 (1803).

*Red. Lil. t. 299 (1809).

- *Reichb. Ic. IX. t. 346, f. 373, 374 (1847).
- Koch, Syn. ed. 2, p. 810 (1844).
- Baker, Journ. Linn. Soc. XVI. p. 139 (1877).
- Handb. Irid. p. 8 (1892).
- Boiss. Fl. Or. v. p. 128 (1884).
- *Bot. Tidsskr. 1882, t. 1.
- Nyman, Consp. p. 702 (1878-82), Suppl. p. 295 (1883-4).
- Richter, Pl. Eur. I. p. 256 (1890).
- *Rev. Hort. Belg. 1892, p. 60.
- *Journ. Hort. Soc. XXVIII. f. 130 (2) (1903-4), poor figures.
- *Sturm, Flora, III. i.

SYNONYMS.

- I. compressa*, Moench, Meth. p. 529 (1794).
- I. sylvatica*, Balbis in Roem and Schult, Sys. Veg. I. 476 (1817).
- I. Adami*, Willd. in Link, Jahrb. I. iii. 72 (1843).
- I. suavis*, Salisb. Prod. p. 44 (1796).
- I. graminea latifolia*, Spach, Hist. Phan. XIII. 30 (1846).
- Baker in Journ. Linn. Soc. XVI. 139 (1877).
- I. bayonnensis*, Darracq, Not. 485 (1846).
- " in Gren. and Godr. Fl. Fr. III. 243 (1855).
- I. lamprophylla*, Lange, Bot. Tidsskr. XIII. 17, t. 1 (1882) (= *I. nikitensis* Lange, ibid.).
- I. inodora*, Spach, Hist. Phan. XIII. 31 (1846).
- Baker, Journ. Linn. Soc. XVI. 139 (1877).
- Lynch, Bk. of Iris, p. 74 (1904).
- I. graminea* var. *pseudocyperus*, Beck, Ann. Wien. Hofm. v. 573 [59] (1890).
- I. pseudocyperus*, Schur, Enum. Pl. Trans. p. 657 (1866).
- Borbas, BZ. 1877, p. 473.
- Baker, Handb. Irid. p. 9 (1892).
- (*I. pseudograminea*, Schur in Index Kew., is probably an error arising from confusion of the two words *pseudocyperus* and *graminea* in Schur's text.)
- I. graminea sylvatica*, Richter, Pl. Eur. I. p. 256 (1890).
- Lynch, Bk. of Iris, p. 74 (1904).
- Xiphium gramineum*, Schrank, Flora, VII. 1824, 2, Beibl. 17.
- Euxiphion gramineum*, Alef. BZ. XXI. 1863, p. 296.
- Xyridion gramineum*, Klatt, BZ. XXX. 1872, p. 500.

DISTRIBUTION. Central and Southern Europe and eastward to the Caucasus.

- Bayonne, 1847, Darracq (K).
- Vallée de Labarthe (St Bertrand), 1838, Munby (K).
- St Hilaire (Limoux), 1825, Petit (K), 1829 (BM).
- Pamplona, 1850, Willkomm (V).
- Piedmont (Roasenda), 1862, Malinverni (E).
- Mte Giorgia (Ticino), 1865, Muret et Favrat (K).
- Val Vestino (S. Tyrol), 1869, Porta (BM).
- Lake Como, 1865, Burnat (V).
- Etruria (Florence La Traversa), 1906, Pampanini (K) (E).
- S. Lorenzo near Vittorio, 1898, Pampanini (E).
- Herkulesbad (Hungary), 1907, Schneider (BM) (V).
- Monte Maggiore, Schultz (BM).
- Banat, 1841, Heuffel (K).
- Carinthia (Ebenthal), 1893, Krebs (E).
- Carniola (Reka valley), Paulin (BM).
- Herzegovina, 1858, Zohrab (K).
- Styria (Cilli), 1860, Reichardt (V).
- Croatia (Fiume), 1870, Pichler (K).
- Belgrade, Friedrich (V).
- Zajecar, 1896, Adamovic (V).
- Caucasus, Radde (K) (E).
- Sylvatica*, Balbis (Hb. Roem) (BM). *Bayonnensis*, Darracq (K). *Nikitensis*, Lange (K).
- Boissier (Fl. Or. v. 128) records a specimen gathered by Heldreich in Cephalonia, but mentions no other instances of the occurrence of the plant in Greece. Indeed, he expressly says that Macedonian and Thracian specimens are always *I. Sintenisii* and not *I. graminea*. The same applies to the Calabrian specimens (1816, Thomas (K), 1839, Gussone (BM)), both of which are *I. Sintenisii*.

Diagnosis.

I. graminea Apogon; *I. spuriae* affinis sed *caule* ancipiti, *monocephalo*, *foliis* supra nitidis multo brevioribus, *tubo* brevissimo, *capsula* truncata nec rostrata differt. Flos prunum redolet.

Description.

Rootstock, a slender, branching rhizome, of the *spuriae* character, forming dense mats.

Leaves, ensiform, but sometimes so narrow as to be almost linear, thin and hard, with several prominent ribs, the upper surface bright green and polished, the under of a paler glaucous green. $\frac{1}{3}$ —1 in. by 15—36 in.

Stem, flattened, with distinct flanges, clothed in one or two sheathing leaves, attached to the lower part and rising in many cases far above the flower. 1—2 flowered.

Spathe valves, 2—10 in. long, sharply keeled, usually unequal and one very often several times as long as the other. (See Fig. 7.)

*Pedice*l, $1\frac{1}{2}$ —2 in. long, rounded trigonal in section.

Ovary, short, with six ribs arranged in pairs, tapering to a very short point at the upper end.

Tube, very short, funnel-shaped.

Falls. The oval haft is separated by a marked but usually gradual constriction from the almost orbicular blade. The ground colour is of a yellowish white, veined on the haft with red purple and on the blade with blue purple. $\frac{3}{4}$ by $1\frac{1}{2}$ —2 in.

Standards, broadly lanceolate, with a short haft, slightly shorter than the falls. $\frac{1}{2}$ by 1 — $1\frac{1}{2}$ in.

Styles, keeled, of a pale reddish purple, becoming broader in the upper part.

Crests, more or less broadly triangular.

Stigma, with two tongue-like points.

Filaments, mauve.

Anthers, purple.

Pollen, orange.

Capsule, 1—2 in. long, narrowing abruptly to a point above, 6-ribbed, with 3 broad and 3 narrow sides, dehiscing down the centre of the narrow sides. (See Fig. 6.)

Seeds, pyriform, sometimes compressed, with a buff-coloured, papery wrinkled coat.

Observations.

It is obvious from the formation of the rhizome, ovary and seeds that this *Iris* is a near relative of *I. spuria* (see Figs. 5, p. 58, and 6), from which, however, it is distinguished by two characters, the curiously flattened stem and the sweet scent of the flowers, which resembles that of a ripe plum or greengage.

As a native of Western and Central Europe, this *Iris* has long been in cultivation and there is preserved in the Cambridge Herbarium a specimen grown in the Botanic Garden in 1733 under the name of *Iris angustifolia prunum redolens* (the plum-scented narrow-leaved *Iris*).

As a garden plant, *I. graminea* can scarcely be said to be ornamental, for, although it is very floriferous, the flowers are hidden among the leaves. As cut flowers, however, the blooms of this *Iris* are distinctly acceptable, for each stem bears a long leaf that rises above the top of the flower, and the scent is delightful. Curiously enough the quality of the scent varies considerably in individual plants. Indeed, in some it is almost entirely absent, while in others it is strongly marked. Seedlings are easily raised and only those should be retained whose flowers are sweetly scented.

In several other respects also this *Iris* is curiously variable. Even on the same plant, stems may be found on some of which the spathe valves are equal in length, while on others one valve is twice or even as much as four or five times as long as the other. In the latter case, it seems almost as though one valve is entirely suppressed and replaced by the sheathing leaf (cf. Fig. 7), which in other specimens is attached at some distance below the spathes.

The width and length of the leaves proper are also very variable. Seeds of a plant with narrow ($\frac{1}{4}$ in.) grassy leaves will produce some plants with leaves 1 in. at least in width and twice as long as those of the seed parent. In some cases, too, the growth is much less dense and the ribs on the leaves more marked and prominent. To a plant of this description the name *I. pseudocyperus* was given by Schur (Enum. Pl. Transs. 657 (1866), cf. also Borbas in BZ. 1877, p. 473), but the evidence of seedlings of the various forms shows that they cannot be distinguished specifically.

Like the other members of the *spuria* group, *I. graminea* is easily cultivated in any well-worked garden soil and is equally easily increased either by division in late summer or early autumn or by seeds. Seedlings grow quickly and flower in one or two years from the time the seeds germinate.

¹ These three specimens were taken from one plant growing in my garden.

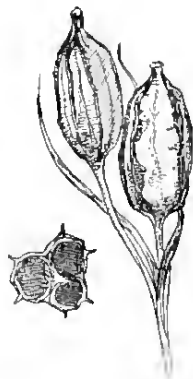


FIG. 6. Capsules of *I. graminea*.



FIG. 7. The unequal spathe valves of *I. graminea*¹.

Varna, 1907, Schneider (K) (V) (B) (BM).
 " 1907, Velenovsky (V) (BM).
 Valona (Albania), 1892, Baldacci (K) (V).
 Attica, 1873, Schmidt (B).
 Mt Kyllene, 1862, J. S. Mill (K).
 Malakasi, 1896, Sintenis (B) (V).
 Philippopolis, 1891, Stribny (B).
 Dobrudscha, 1874, Sintenis (B).
 Boghoorlu (N. Syria), 1877, Post (K).

Diagnosis.

I. Sintenisii Apogon; *I. graminea* similis sed *caule* tereti, *foliis* utrinque glaucis, *ovario* longe rostrato differt.

Description.

Rootstock, a hard, slender, wiry rhizome, clothed in the remains of old leaves which break off without splitting into fibres.

Leaves, narrow, linear, acuminate, 8—18 in. by $\frac{1}{4}$ — $\frac{1}{2}$ in.

Stem, round, not flattened as in *I. graminea*, 4—12 in., almost entirely clothed in 2—3 reduced leaves, and bearing only a single terminal head of two flowers. The uppermost leaf on the stem reaches to the level of the top of the inner spathe valve.

Spathe valves, narrow, linear, acuminate, $1\frac{1}{2}$ —3 in. long, the inner being slightly longer than the outer. Both are distinctly keeled (see Plate XVII a).

Pedicel, $\frac{1}{2}$ — $1\frac{1}{2}$ in. long.

Ovary, slightly shorter than the pedicel, with a long tapering neck and a double ridge at each angle.

Tube, short as in *I. spuria*, unless the long neck of the ovary be looked upon as tube.

Falls. The slightly panduriform oblong haft is separated by a gradual constriction from the elliptical blade. On the blade the colour is the result of spreading blue purple veins on a white ground. At the level of the stigma the white ground is dotted with minute blue purple dots. Along the haft the veins are of a reddish purple.

Standards, oblanceolate with a wedge-shaped haft, emarginate; of a deep blue purple. The haft is of a different texture to the blade, and appears much darker.

Styles, narrow oblong, with a minute sharp keel.

Crests, small, triangular.

Stigma, with two tongue-like points.

Filaments, yellowish.

Anthers, pinkish yellow.

Pollen, orange.

Capsule, blunt at the base, tapering above into a long neck and having close-set double ridges at the three angles.

Seeds, mostly of a somewhat flattened D-shape, with loose brown wrinkled skins, distinctly less globular than those of *I. graminea*.

Herbarium specimens.

The general appearance is that of a very slender *I. spuria*. From the latter it is separated by the narrow linear sharply keeled spathes and by the absence of lateral flower heads.

It is sometimes confused with *I. graminea*, which differs by its flattened stem and by its lack of perianth tube or rather by the fact that the neck of the ovary is not elongated as in *I. Sintenisii*.

Observations.

This species forms a transition between *I. graminea* and *I. spuria*. From the former it differs in having a round and not a flattened stem and a long neck to the ovary, while it is distinguished from the latter by its acutely keeled spathes and by the apparently invariable absence of lateral buds below the terminal head of two flowers.

As far as my experience goes, cultivation is easy, and is merely that of the other members of the *spuria* group. (See p. 58.)

I. KERNERIANA

Ascherson and Sintenis MS. ex Baker, Gard. Chron. 1884, 1. p. 795.
 Baker, Hbk. Irid. p. 16 (1892).

SYNONYMS.

I. Haussknechtii, Bornmüller, Pl. Exsic. Anatol. no. 1864.
 Baker, Hbk. Irid. p. 4 (1892).
I. Gransaultii, Siehe (Hort. Possibly unpublished).



X 1

a. *Iris setosa* b. *Iris pallida* W.

DISTRIBUTION. Asia Minor.

Mt Ida, near Kareikos, 1883, Sintenis (K) (BM) (E) (B).
 Armenia Turcica (Sipikor Dag), 1889, Sintenis (K) (B) (V).
 Amasia (Abadsih Dag), 1890, Bornmüller (K).
 Paphlagonia, Wilajet Kastambuli (Tossia Jiaur Dag), 1892, Sintenis (O) (K) (BM) (B).
 Akdag (N. of the Halys), 1902, Gransault (E).

Diagnosis.

I. Kerneriana Apogon; *I. spuria* similis sed foliis laxioribus, caule tenuiore monocephalo, floribus luteis differt. Ab *I. Sintenisii* spatharum valvis rotundatis nec carinatis et segmentorum forma differt.

Description.

Rootstock, a slender rhizome, about as thick as a goose's quill.

Leaves, ensiform, about 18 in. long by $\frac{1}{4}$ — $\frac{1}{2}$ in. wide, pale yellowish green, finely ribbed, produced in thick clusters.

Stem, 6—12 in., wholly hidden by sheathing leaves, with a terminal head of two flowers, internodes sometimes bare, sometimes concealed.

Spathe valves, 3 in. long, slightly keeled, somewhat ventricose, pointed, green, scarious at the tip and upper edge.

Pedicel, about an inch long.

Ovary, as in *I. spuria*, with three double ridges, $\frac{1}{2}$ in. long, with a narrow neck.

Tube, funnel-shaped, $\frac{1}{2}$ in. long, with many ridges.

Falls. The broadly lanceolate blade has a wavy edge and is separated from the narrow haft by an extremely slight constriction. The colour of the blade is a rich yellow with a paler margin; the haft is also of a paler yellow, and the central ridge is very slightly raised. $2\frac{1}{2}$ in. long by $\frac{3}{4}$ in. broad.

Standards, linear lanceolate, deeply emarginate, with a wavy edge, tending to twist spirally, yellow.

Styles, much arched longitudinally and pressing close down on to the haft of the fall.

Crests, small, triangular, much recurved.

Stigma, bilobed, with two triangular teeth.

Filaments, expanding at the base.

Anthers,

Pollen,

Capsule, resembles that of *I. spuria*, being hexagonal, by reason of the three double ridges.

Seeds,

Observations.

This species is distinguished from the other members of its group by the less rigid leaves, more membranous and scarious spathes, and by the lanceolate blade and narrow haft of the falls.

It probably comes nearest to *I. Sintenisii*, but, as far as can be seen from dried specimens, the spathe valves are not sharply keeled.

I. SONGARICA

Schrenk, Enum. Pl. nov. I. p. 3 (1841).

Maxim. in Bull. Acad. Pét. XXVI. p. 510 (1880).

Mél. Biol. X. p. 510 (1880).

Baker in J. L. S. XVI. p. 138 (1877).

Hdk. Irid. p. 5 (1892).

Boiss. Fl. Or. V. p. 126 (1884).

SYNONYM.

Iris oxypetala, Meyer (fide Klatt, Linn. XXXIV. p. 614, 1866).

Ioniris songarica, Klatt in BZ. XXX. p. 502 (1872).

DISTRIBUTION. From Persia to Western China.

Persia. Kaswin near Kischlak, 1902, Bornmüller (B).

Kerman; Mt Kuh-i-Dschupar, 1892, Bornmüller (B) (V) (K) (BM).

Media; Echatanensi, 1882, Pichler (Exped. Polak) (V).

Askabad, 1886, Kye (B).

Askabad, between Annaja and Gjaurs, 1900, Sintenis (K) (BM) (V) (B) (E).

Ispahan to Kerman, 1859, Bunge (K).

Luristan, 1884, Bell (K).

Turkestan. Bokhara; Kermine, 1887, Regel (B) (V).

Between Karatschoki and Tschingildy, 1880, Regel (BM) (K) (B) (V).

Turkestan, 1878, Fetissow (BM) (V).

Afghanistan. Hari-rud Valley and Kushk River, 1884–85, Aitchison (K) (BM) (B).

Afghanistan, 1852, Griffith (K).

Beluchistan. No locality given, 1851, Stocks (no. 982) (K) (C).

" " 1891, Cleghorn (BM)

" " 1888, Hance (K).

Thibet. Batang; Tonglado, 1904, Soulié (P).

Between Batang and Lhasa, 19—, Prince H. d'Orléans (P).

Songaria. Ajagas, 1841, Schrenk (BM) (K).

Balchash, 1841, Schrenk (K).

Atassu, 1843, Schrenk (K) (V).

Between the R. Tschulak and the R. Ai, 1841, Karelin and Kirilloff (B) (V).

Szechuan. Kiala; Tongolo, 1893, Soulié (P) (K).

Kansu. Tangut, 1880, Przewalski (K). (This is quoted by Maximowicz as his variety "*gracilis*," cf. Bull. Acad. Pét. xxvi. p. 510 (1880), but it only differs from the type in size, which may well depend on soil and environment.)

Diagnosis.

I. songarica Apogon; *I. spuriae* varietatibus orientalibus haud dissimilis sed *rhizomate* fibris oblique transversis oblecto, *tubo* longissimo, *stylis* cristis longe acuminatis, *capsulae* elongatae valvis subchartaceis apice rectis nec recurvatis, *seminibus* cylindricis truncatis satis differt.

N.B. The description given below is taken from Foster's unpublished MS., and is that of some plants received by him early in 1885 through Kew from Dr Aitchison, who collected them on the Afghan Boundary Commission between Sir Mandel and Sher Baksh at an elevation of 3000 ft.

Rootstock, a small dark rhizome about as thick as a pencil, bearing dense tufts of leaves, the remains of which split into fibres running diagonally over each other and produce a spiral effect.

Leaves, 6—15 in. long, $\frac{3}{8}$ — $\frac{1}{4}$ in. broad, firm, strongly ribbed.

Stem, round, solid, about 15 in. high and $\frac{1}{2}$ in. diameter, clothed at the base by clasping leaves, bearing 1—4 spicate heads, each containing 2—3 flowers.

Spathe valves, the lower 4 in. and the upper 5 in. long, closely embracing the bud, light-green, but distinctly scarious at the tip and along the upper margin.

Pedicel, $\frac{1}{2}$ in.

Ovary, rounded trigonal, with a slight ridge on each face, tapering gradually into the tube.

Tube, $1\frac{1}{2}$ — $2\frac{1}{2}$ in. long, green with purple spots in the line of the standards.

Falls. The elliptical blade is separated by a constriction from the long oval haft, which is dotted with reddish purple on a very faint blue ground. On the blade the median portion is bluish with minute purple spots, and beyond this the ground is paler, almost white, and the dots larger and more distinctly purple. $2\frac{1}{2}$ in. long by $\frac{3}{4}$ in. broad.

Standards, oblanceolate cuneate, rather more than $2\frac{1}{2}$ in. long by $\frac{1}{2}$ in. broad, covered by a network of imperfect veins and irregular small blotches of a red purple, the ground being white or very faint purple.

Styles, shorter and narrower than the haft of the falls, whitish dotted with purple.

Crests, narrow, nearly 1 in. in length and crossing one over the other.

Stigma, bilobed with two triangular teeth.

Filaments, purple.

Anthers, reddish.

Pollen, deep reddish orange.

Capsule, oblong, $1\frac{1}{2}$ in.

Seeds, cylindrical, dark brown, with a wrinkled skin.

Observations.

This Iris, which is unfortunately not at present in cultivation in England, seems to form a connecting link between the *spuriae* and the *tenuifolia* groups. It resembles the former in general appearance and in the inflorescence, which usually bears one or more spicate heads of flowers besides the main cluster. The slender rootstock, however, with its masses of transverse fibres closely resembles those of the latter group. Foster had this Iris in bloom at least once, and noted that the flower closely resembled that of a *xiphium* or Spanish Iris in poise and appearance, differing chiefly in the long, tapering and conspicuous style crests.

It would probably not be difficult to cultivate if seeds could be obtained and provided that the plants were kept dry and well ripened after flowering in summer.

X. The *Laevigata* Group.

The four members of this group agree in possessing smooth flattened seeds and branching leafy stems. In three out of the four species, *I. laevigata* being the exception, the prominent central ridge of the leaves is a conspicuous feature.

I. Kaempferi and *I. laevigata* seem to grow in close proximity in North Eastern Asia, while *I. versicolor* appears to be as common on the eastern side of North America as *I. pseudacorus* is in Europe.

The species may be separated as follows:—

- { Leaves without any prominent central ridge.
- { Leaves with a prominent central ridge.

I. laevigata (p. 73).

1.

1. { Standards nearly as long as the falls; flowers unveined. *I. Kaempferi* (p. 74).
 Standards much shorter than the falls. 2.
2. { Standards narrow, acuminate or spoon-shaped; usually less than half as long as the falls; flowers yellow or cream. *I. pseudacorus* (p. 76).
 Standards broad oblanceolate, at least half as long as the falls; flowers purple. *I. versicolor* (p. 79).

† *I. LAEVIGATA*

Fischer in Turcz. Cat. Baik. no. 1119 (1837).

Fischer and Meyer, Ind. Sem. Hort. Petrop. v. p. 36 (1838).

Turcz. Fl. Baic. Dahur. II. pt 1. p. 196 (1856).

Maxim. in Bull. Acad. Pét. XXVI. p. 521 (1880).

*Somoku Zusetsu, II. no. 4 (Japonice Kakitsubata).

SYNONYMS.

I. aestiva, Pallas MS. in Hb. Linn. Soc. from swamps near Lake Baikal, cf. Turcz. l.c. "ad Baikalem prope monasterium Possolskoj copiosissime."*I. Mancki*, Maxim. in Bull. Acad. Pet. XXVI. p. 542 (1880).†‡ var. *albopurpurea*, Plate XVIII, Makino in Bot. Mag. Tokyo, 1909, p. 95.

SYNONYM.

I. albopurpurea, Baker in Bot. Mag. t. 7511 (1896).N.B. Owing to the fact that *I. Kaempferi* and *I. laevigata* have been looked upon as synonymous, the literature has become very confused.

DISTRIBUTION. Eastern Asia, China and Japan.

Eastern Asia. Altai Region, 1830, Prescott (K) (E).

Dahuria, Fischer (C).

Irkutsk, Hb. Besser (K) (V).

Schschukin (BM).

Possolsk, 1829, Turczaninow (SP).

Amur region, Maximowicz (K) (V).

Blagowjestschenk, 1898, Karo (BM) (K) (E) (V).

Eastern Siberia, Hb. Arnott (E).

R. Amgun, 1909, Kusnezow (SP).

China. Mukden, 1886, James (K).

Peiling (Mukden), 1886, Webster (K).

Yunnan (at 5000 ft.), Henry (no. 11927 A) (B) (E).

Corea. Chemulpo, 1884, Carles (E).*Japan*. Hakodate, 1861, Maximowicz (K) (BM) (V).

Musashi (Tokio), Samboji, Takeda (K).

1903, Uno (BM).

1905, Yokohama Nursery Co. (E).

Diagnosis.

I. laevigata Apogon; *folia* ensiformia, lata, pedalia, vel sesquipedalia; *caulis* foliis brevior, plerumque simplex, foliis plerumque trinis abbreviatis infra medium instructus; *segmenta* omnia intense coerulea; *capsula* oblonga, turgida; *semina* laevigata.

Description.

Rootstock, a compact somewhat slender rhizome.*Leaves*, pale yellow-green, about 18 in. by $1\frac{1}{2}$ in., without the conspicuous midrib of *I. Kaempferi*.*Stem*, stout, somewhat crooked, bearing one reduced leaf below the middle and a terminal head of 3—4 flowers. There are also 2 small leaves at the base. In very strong specimens a lateral head of 2—3 flowers may develop.*Spathe valves*, green, navicular, unequal, sharply keeled, reaching above the tube; the inner valve is sometimes as much as 4 in. in length, while the outer is only $2\frac{1}{2}$ in.*Pedicel*, short at first, and not much above an inch in the fruiting state.*Ovary*, rounded trigonal with a slightly raised ridge down the centre of each side.*Tube*, $\frac{1}{2}$ — $\frac{3}{4}$ in.*Falls*. The large ($2\frac{1}{2}$ by 2 in.) obovate blade is about twice as long as the small narrow canalliculate haft. The latter is yellow, edged with purplish blue, and the central yellow ridge extends on to, and expands a little on, the blade. The colour is a rich deep blue.*Standards*, erect, oblanceolate, about $2\frac{1}{2}$ in. long.*Styles*, 1— $1\frac{1}{2}$ in. long, becoming wider upwards.*Crests*, large and rounded.*Stigma*, obscurely bilobed.*Filaments*, short, white.*Anthers*, twice as long as the filaments, white, the pollen sacs being narrow and separated by a distinct interval.

Pollen, creamy white.

Capsule, 2 in. long, oblong, much-rounded trigonal, with blunt ends (see Fig. 8).

Seeds, semi-circular, compressed, encased in thick, loose, smooth, glossy, pale brown coats. The effect of this loose coat is that the seeds float in water.



FIG. 8. Capsules of *I. laevigata* ($\frac{2}{3}$ actual size).

Observations.

The differences between this species and *I. Kaempferi* will be found described in the Observations on the latter. The typical plant is still very rare in cultivation, at any rate in Europe, although garden forms from Japan have been known for some years under the name of *I. albopurpurea*. This came originally to Kew by chance, mixed up with plants of *I. Kaempferi* and was described by Baker as a species. A few years ago I obtained from Japan a plant or two of the blue-flowered type under the name of *I. albopurpurea* and, when these flowered, it was at once obvious that this was the plant of which *albopurpurea* is a quasi-albino garden form. The latter breeds true from seed as regards colour, for all the seedlings of the original Kew plants that have so far flowered with me have borne white flowers mottled and spotted with blue purple (see Plate XVIII). From this plate the type may be pictured by imagining the deep blue colour to obscure the white throughout. It was intended to have a plate of the typical plant, but unfortunately my two plants were both flowerless, having been allowed to seed freely in the previous year, and a specimen of *albopurpurea* had therefore reluctantly to be substituted. In all botanical details the variety is identical with the type, and it is only the colour that is different.

Little evidence is available as to doubling in Iris flowers, but it may be worth while to record here that among seedlings raised from the original Kew plants of *albopurpurea* several double-flowered plants have appeared, similar in every way to the ugly monstrosities that are often sent from Japan under the name of *I. albopurpurea*.

The cultivation of this species presents no special difficulty provided that the soil is fairly rich in humus, not charged with lime nor allowed to become too dry in summer.

By the kindness of Dr B. Fedtschenko I have recently been allowed to see the unique specimen on which Maximowicz founded his *I. Maacki*. This was found by Maack on the left bank of the Ussuri opposite the mouth of the Ima, and consists merely of a few leaves and the upper part of a branched stem bearing mature capsules of ripe seeds. The oblong capsules vary in size, but the largest is nearly $3\frac{1}{2}$ in. long, and all have the characteristic short broad beak of the species. The seeds too are dark brown, with smooth skins (cf. Plate XLVIII, fig. 1). Mme Olga Fedtschenko has recently sent me a copy of a note printed in Kneucker's Allgemeine Botanische Zeitschrift no. 6, 1906, in which she also comes to the conclusion that *I. Maacki* is nothing but a synonym of *I. laevigata*¹. The plant was originally identified by Regel as *I. pseudacorus* (Tent. Fl. Ussur. 490), which does not, however, extend into Eastern Asia.

†† *I. KAEMPFERI*

(PLATE XIX)

- *Siebold ex Lemaire, Illustr. Hort. v. (1858), t. 157.

(It is probable that this plate represents a garden form of *I. Kaempferi* obtained from Japan by Siebold and flowering for the first time in Europe in 1857, in Verschaffelt's garden in Ghent. The plant represented is, however, practically identical with the wild species except possibly in colour and in this respect the plate may have changed.)

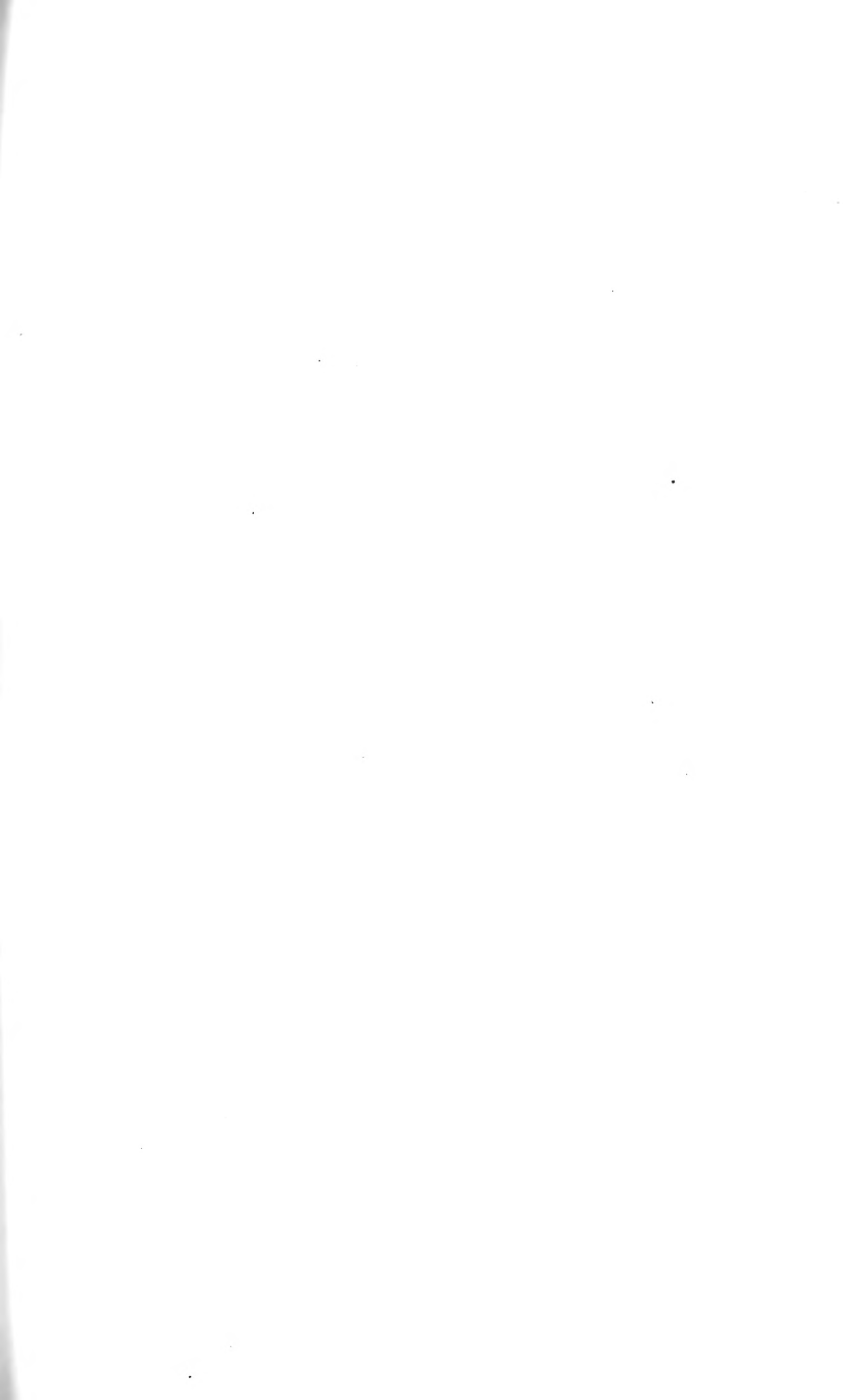
- *Flore des Serres, t. 2073, 2074 (1874), 2431-2436 (1880).
- *Gard. Chron. 1874, II. p. 47 (Garden variety).
- *Eeden, Album, t. 87 (Garden varieties).
- *Somoku Zusetsu, II. no. 3.

N.B. Owing to the fact that *I. Kaempferi* and *I. laevigata* have been looked upon as synonymous, the literature is very confused.

SYNONYMS.

- **I. laevigata*, Regel, Gartenflora. 1864, p. 198, t. 442.
1880, p. 65, t. 1003.
- *Bot. Mag. t. 6132 (1874).
- Miquel, Prol. Fl. Jap. p. 306 (1867).

¹ I cannot understand Mme Fedtschenko's remark (l.c.) that both on Maack's specimen and in living plants of *I. laevigata* the capsules and ovary are covered with short, close-set hairs. I have failed to find any trace of them.





XVIII

Iris latifolia
var.
albapurpurea

I. laevigata var. *Kaempferi*, Maxim. in Bull. Acad. Pét. XXVI. p. 521 (1880), and in Mém. Biol. X. p. 712 (1880).

I. pseudacorus, Regel, Tent. Fl. Ussur. p. 162 (1862).

I. Maacki, Maxim. in Bull. Acad. Pét. XXVI. (1880), p. 542.

I. Kaempferi var. *spontanea*, Makino in Bot. Mag. Tokyo, 1909, p. 94.

**I. tectorum*, Somoku Zusetsu II. no. 3 (Japan. Hana-shiyobu).

Japanese name, Hana-shôbu (fide Dr Takeda), that of the variety *albopurpurea* being Washi-no-o.

DISTRIBUTION. Manchuria, North China, Korea and Japan.

Manchuria. R. Ussuri, Maack (K) (St Petersburg).

Lake Hanka, 1898-99, Bohnhof (K).

Blagowjestschensk, 1898, Karo (K) (E) (B).

R. Amur, 1867, Przewalski (K) (BM).

North China. Toong-hwa-hien (Black Bear Valley), 1887, Ross (K).

Korea. Chemulpo, 1884, Carles (E) and 1885 (K).

1906, Faurie (L).

Worisan, 1892, Veitch (BM).

Wen-san, 1906, Faurie (L).

Chinnampo, 1901, Faurie (L).

Japan. Rikuchiu, Iwate-san, 1895, Watanabe (K).

Central Mountains, 1880, Maries (K).

N.B. There exists in the Kew Herbarium an Iris leaf, found among plants of *I. Clarkei* collected by Sir Joseph Hooker in 1848. It is dated May 15th, when Hooker was returning to Darjeeling from the Bhutan frontier. The leaf is almost certainly that of *I. Kaempferi* and Dr Stapf tells me that sections of the two correspond. It may be found therefore that *I. Kaempferi* extends further west than has hitherto been thought to be the case.

Diagnosis.

I. Kaempferi Apogon; folia ensiformia, bipedalia vel etiam longiora, costâ media conspicua; caulis foliis subaequalis, aut simplex, foliosus aut ramosus cum foliis abbreviatis ad basim ramorum insitis; segmenta omnia laete purpurea nec coerulea; capsula in apiculum crassum attenuata; semina compressa, suborbicularia.

Description.

Rootstock, a fairly stout, short-creeping rhizome.

Leaves, ensiform, 2-2½ ft. by ½-¾ in., with a distinct "midrib" throughout the whole length.

Stem, from 16 in. to over 2 feet in height, bearing 1-3 reduced leaves and usually a lateral branch, besides the terminal head of two flowers.

Spathe valves, 3 in. long, narrow, irregularly covered with minute papillae, visible in the dried state.

Pedicels, ½-1¼-2 in., of varying length in the different flowers and at different stages of growth.

Ovary, rounded trigonal, with six grooves.

Tube, ½-¾ in. round, light green, hardly at all funnel-shaped.

Falls. The narrow oblong haft is about an inch long and yellow in the centre, with a raised ridge, which runs on to the blade, where it becomes minutely pubescent. The sides of the haft and the rest of the oval or obovate blade are of an intense red purple, 3 in. long.

Standards, narrow oblanceolate, about two-thirds the length of the falls, of the same red-purple colour.

Styles, deep violet, much rounded.

Crests, small, subquadrate, erect, so that the tips are almost on a level with the top of the standards.

Stigma, entire, broad, with irregularly dentate edge.

Filaments, purple, short.

Anthers, pale yellow, more or less flushed with mauve, twice as long as the filaments.

Pollen, orange.

Capsule, short, not more than an inch in length, tapering at either end and obtusely beaked, not sharply pointed. The sides are concave and the angles grooved (see Fig. 9, p. 76).

Seeds, flat, circular, or nearly circular, discs.

Observations.

This Iris has long been confused with *I. laevigata*, and this confusion is perhaps hardly surprising in view of the fact that the two species apparently grow in proximity the one to the other in the marshes on the banks of the river Amur in Manchuria, and also in Japan. They may however be easily distinguished by certain constant features. The most obvious is that the leaves of *I. Kaempferi* have a conspicuous central rib, while in those of *I. laevigata* this is almost entirely absent, though a very slight line is sometimes visible near the tip. The flowers are wholly different in colour, those of *I. Kaempferi* being always reddish purple, while the true *I. laevigata* has the most magnificent blue flowers of any known Iris. The capsules and seeds are also very different (cf. Fig. 8, p. 74, and Fig. 9, p. 76).

In making *I. Kaempferi* a variety of *I. laevigata*, Maximowicz (l.c.) clearly pointed out one of the most obvious differences between the two plants, for he describes it as foliis angustis elevato-nervosis costa media distincta and *I. laevigata* as foliis latis laevibus costa media obsoleta. With further knowledge of

the capsules and seeds and of the habit and appearance of the growing plants, it seems impossible not to separate them into two distinct species.



FIG. 9. Capsules of *I. Kaempferi*
($\frac{2}{3}$ actual size).

The origin of the many Japanese garden forms of this Iris has never been disclosed. With their usual inclination towards distortion and the abnormal, the Japanese seem to have aimed at increase in the size of the falls and decrease in the standards. It seems not impossible that in the early stages *I. Kaempferi* may with this end in view have been crossed with *I. setosa*, which is also a native of Japan, and in which the standards are reduced to mere bristles, while the falls are often very large. I cannot bring any evidence in support of this suggestion except its obvious plausibility, and it must be admitted that among large numbers of seedlings of Japanese forms of *I. Kaempferi*, no examples of, or approaches to, *I. setosa* have been known to appear.

There is in the Royal Horticultural Society's garden at Wisley an old shallow ditch running through what was originally a field. In this position numbers of imported Japanese Irises were planted by the late G. F. Wilson, but now the majority of them seem to have died out and the seedlings that have sown themselves and sprung up are largely approximations to the type and to the white form of it.

In Japan these hybrids are grown in special gardens, which can be flooded to the depth of a few inches in summer and kept comparatively dry in winter. During the winter months when growth is inactive, that is from November to February, liberal applications of strong liquid manure are given every two or three weeks. While growth is active, water and not manure must be provided. Here in England the imported plants rarely do well without similar treatment, unless the natural soil is unusually tenacious and rich. Experience both of imported Japanese plants and of home-raised seedlings of the type has shown that the latter are much less exacting in their requirements than the former, and that they may be readily grown and flowered in any fairly rich garden soil. A certain degree of moisture during the growing season is a necessity if the plants are to develop to their proper size.

When transplantation is necessary, it should be carried out soon after the flowering season, by preference late in August or at any rate early in September. If the operation cannot be performed then, it should be postponed until growth is beginning again in March.

Among the Japanese garden forms many double flowered plants are to be found in which the standards and even the style branches seem to have been metamorphosed into falls. This is the type of Iris that is so commonly seen in Japanese decorative art, though it can scarcely be maintained that these monstrosities are as graceful as the typical single-flowered forms. Gorgeous colour they doubtless possess in a wider range, perhaps, than almost any other Iris, but the colours are not pure, and the effect is in some cases frankly ugly and displeasing to our western taste.

⁺⁺*I. PSEUDACORUS*

- Linn. Spec. plant. ed. 1. p. 38 (1753).
- Plenck, Icon. t. 36 (1788).
- Lam. Encycl. III. p. 299 (1789).
- Schneevogt, Icon. t. 20 (1793).
- Red. Lil. IV. t. 235 (1808).
- Host, Fl. Aust. 1. p. 47 (1827).
- Koch, Syn. ed. 1. p. 701 (1837).
- Grisebach, Spic. fl. rum. p. 370 (1843).
- Reichb. Icon. IX. t. ccxlv. fig. 771 (1847).
- Ambrosi, Fl. de Tirol. merid. p. 644 (1854).
- Gren. et Godr. Fl. de France, III. p. 242 (1855).
- Baker in J. L. S. XVI. p. 140 (1877).
- Hdk. Irid. p. 11 (1892).
- Nyman, Consp. p. 702 (1878), Suppl. p. 295 (1890).
- Boiss. Fl. Or. v. p. 127 (1884).
- Richter, Pl. Eur. 1. p. 257 (1890).
- Schinz und Keller, Fl. Schweiz, 1. p. 108 (1900).
- Asch. und Graebner, Syn. III. p. 493 (1906).



XIX

Iris Kaempferi

SYNONYMS.

- I. sativa*, Miller, Gard. Dict. ed. VIII. no. 15 (1768).
I. lutea, Lam. Fl. Franç. III. p. 496 (1778).
I. palustris, Moench, Meth. p. 528 (1794).
I. longifolia, Lam. et DC. Fl. Franç. III. p. 295 (1805), non Royle nec Spach nec Schneev.
 Baker in J. L. S. XVI. p. 140 (1877).
I. paludosa, Pers. Syn. I. p. 52 (1805).
I. curtropetala, Delav. in Red. Lil. t. 340 (1812).
I. acoroides, Spach, Hist. Vég. phan. XIII. p. 44 (1846).
I. acoriformis, Bor. Fl. Cent. Fr. ed. III. ii. p. 635 (1857).
I. Bastardi, Spach, Hist. Vég. phan. XIII. p. 44 (1846).
Xiphium pseudacorus, Parlat. Fl. It. III. p. 295 (1858).
Xiphium acoroides, Alef. BZ. XXI. p. 297 (1863).
Limniris pseudacorus, Fuss. Fl. Transs. p. 636 (1866).
Xyridion pseudacorus, Klatt in BZ. XXX. p. 500 (1872).
 „ *acoroides*, Klatt, ibidem.
I. flava, Tornab. Fl. sicul. p. 212 (1887).

DISTRIBUTION. This Iris is distributed over the whole of Europe. It extends also to North Africa, Asia Minor and as far east as the Caucasus, and even possibly into Siberia.

- Scandinavia.* Westmannia, 1861, Ahlberg (K) (BM).
 Stockholm, 1839, Andersson (K) (E).
 Upsala, 18—, Hb. Ascherson (B).
Great Britain. Rickmansworth, 1892, Crespiigny (B).
France. Cognac, 1867, Guillon (K) (BM).
Spain and Portugal. Granada, 1845, Willkomm (K).
 Porto, 1880, Newton (K).
 Chiclana, 1849, Bourgeau (K) (C).
 Coimbra, 1901, Ferreira (B).
 1880, Motter (E).
 Serrania de Cuenca, 1898, Gaudoyer (V).
 Madeira, 1777, Masson (BM).
North Africa. R. Sebu, 1887, Grant (K) (B).
 Mauretania, 18—, Bové (V).
Germany. Berlin, 1879, Siemen (B).
Austria. Aistershaim, 1876, Keck (BM).
 Laibach, 18—, Paulin (BM).
 Dobrudscha (Tulscha), 1872, Sintenis (B).
Switzerland. Bremgarten, 1837, Hb. Shuttleworth (BM).
Italy. Ravenna, 1831, Bubani (B).
 Verona, 1870, Riga (B).
Sicily. Castelvetro, 1906, Ross (E).
Crete. Niochorio, 1821, Sieber (K).
Balkans. Jajce, 1905, Crawford (E).
 Plavnica, 1886, Szyszylowicz (V).
 Corabia (Rumania), 1892, Lorenz (V).
 Reljevo (Bosnia), 1869, Blau (B).
 Karafena (Macedonia), 1891, Abd-ur-Rahman-Nadjı (B).
 Ladovo (Bulgaria), 1902, Stribrny (E).
Russia. Sarepta, 1878, Becker (BM).
 Lithuania (Holonety), 1893, Rudominowna (BM) (V) (B).
 Caucasus, 18—, Radde (K).
Greece. Tiryns, 1857, Orphanides (B).
Asia Minor. Troy, 1864, Schmidt (B).
 1879, Virchow (B).
 Smyrna (Kazikli), 1893, Whittall (K).
 Lycia, 1854, Berg (B).
 Erzeroum, 18—, Calvert (C).
 River Kadikeni (Anatolia), 1865, René du Parquet (BM).
Syria. El Hulet, 1863-4, Lowne (K).
 Abana, 18—, Hayne (K).
 Beicos, 1877, Post (BM).
 Alexandretta, 1859, Kotschy (V).
 Antilebanon (Wady-el-Laru), 1886, Post (B).
Siberia. River Tolka, 1868, Carroll (B).

Diagnosis.

I. pseudacorus Apogon; *folia* ensiformia, costa media conspicua; *caulis* ramosus; *segmenta* interiora parva, exterioribus multo minora; *semina* compressa laevigata; *flores* lutei.

Description.

Rootstock, a stout rhizome with pink flesh, clothed in the fibrous remains of old leaves.

Leaves erect, ensiform, 2 feet or more in length, slightly glaucous, especially near the base, and bearing a conspicuous midrib.

Stem, 2—3 feet high, much branched, sometimes with equal lateral branches on either side of the same point on the stem.

Spathe valves, very like those of *I. versicolor*, oblong, green with brown but scarcely scarious edge. The outer valve is sharply keeled, $2\frac{1}{2}$ — $3\frac{1}{2}$ in. long, the inner of equal length but not keeled, 3—5 flowered.

Pedicel, 1—2 in. of varying lengths, often too slender to hold the ripe capsule erect.

Ovary, trigonal, with hollow sides and a narrow groove down each angle, $\frac{1}{2}$ in. long.

Tube, slightly lighter green than the ovary, from which it is not separated by any constriction, $\frac{1}{2}$ in. long.

Falls. The haft is broad and narrows suddenly at the base, near which it usually, if not always, bears two raised ridges or flanges, which fit into hollows in the standards. The central line is slightly raised to form a greenish-yellow, pubescent ridge. The blade is broadly lanceolate or ovate or sub-orbicular, and usually, but not always, veined with brown-purple or violet on a yellow or creamy ground; or it may bear brown-purple mottlings between the veins. A distinct patch of a deeper shade of yellow is often conspicuous on the blade.

Standards, pale yellow, of varying outline, sometimes a mere point as in *I. setosa*, but usually spoon-shaped, about an inch long, lanceolate-unguiculate, winged at the base.

Styles, broad, keeled, sometimes oblong, in other specimens almost triangular.

Crests, small, quadrate, either of a pale concolor yellow, or veined with purple.

Stigma, a prominent tongue.

Filaments, cream, slightly longer than the anthers.

Anthers, cream to orange, edged with dark purple or wholly purple-brown.

Pollen, cream.

Capsule, $1\frac{1}{2}$ — $2\frac{1}{2}$ in length, oblong, narrowing gradually to a short beak at the apex.

Seeds, flattened, D-shaped or nearly circular, with a smooth, light brown outer skin.

Observations.

This widely distributed Iris is undoubtedly liable to considerable variation in the size, shape and colour of the segments of the flower, but it seems inadvisable to distinguish by name some of the forms while others are passed over.

For instance, Boreau l.c. gives as a difference between the varieties *Bastardi* and *acoriformis* that the former is not blotched with a deeper shade of yellow at the base of the blade, while in the latter the deeper coloured blotch is conspicuous. The evidence of seedlings goes to show that the presence and absence of this blotch are a Mendelian pair of characters, of which the presence is dominant over the absence. Evidence for this is derived from the fact that self-fertilized seed of some wild plants obtained from the River Wey near Godalming gave one plant on which no blotch was apparent. Moreover, when this plant was in its turn self-fertilized, all the seedlings were without the blotch.

Another peculiarity on which a varietal name has been founded is the amount of brown or violet veining present on the segments, cf. var. *acoriformis* Boreau l.c. This character is, however, very variable. For instance, this Iris grows extensively along a stream between Hyères and the sea, and a close examination of successive plants growing in close proximity to each other showed that the style-crests were either pure yellow or veined with purple, while the anthers were either wholly of a deep brown-purple or yellow edged with brown. Moreover, the styles were very variable in shape; in some examples the sides were nearly parallel, while in others the divergence was so great that the surface became triangular.

I have it on the authority of Mr G. Yeld, of York, that the pale ochraceous yellow unblotched form, known in gardens as *Bastardi*, was found by members of his family growing in a field near Llanfairfechan in North Wales, and that a certain proportion of seedlings of the golden yellow type are pale yellow-flowered forms. I have little doubt that in all the various forms of *I. pseudacorus* we are dealing with various combinations of unit characters, which might be proved to behave in accordance with Mendelian principles.

The statement of Spach (l.c.) that, in his variety *acoroides*, the usual callosities were not present at the base of the haft of the falls is uncorroborated, and may possibly be explained by the fact that he may have been dealing with dried herbarium material, in which case it would most probably have been difficult, if not impossible, to distinguish them. As, moreover, the plant was said to come from America, it is not impossible that Spach mistook for *I. pseudacorus* a specimen of *I. versicolor*, which in the dried state might well have flowers of a yellow-brown colour, and on which the callosities are perhaps less prominent than on *I. pseudacorus*.

There is in cultivation in gardens a form of *I. pseudacorus* with variegated leaves, the yellow edge naturally being that towards the centre of each tuft.

Of the cultivation of this Iris little need be said, except perhaps that the plant deserves better treatment in our gardens than is usually accorded to it. Though it grows most luxuriantly in the richest damp bog soil, it is still capable of producing a fine effect in any well enriched garden soil. Even in dry sandy soil, it will grow and flower, but, of course, mulching with old manure and leaf-soil are well repaid.

No hybrids of this species appear to be known, but there seems no reason why crosses should not be successful with such a species, for instance, as *I. versicolor*, to which it has many affinities.

†† *I. VERSICOLOR*

- Linn. Sp. Plant. ed. 1. p. 39 (1753).
 *Bot. Mag. t. 21 (1787).
 Pers. Syn. Plant. p. 52 (1805).
 *Red. Lil. t. 339 (1812).
 *Bigelow, Med. p. 16 (1817).
 Baker in J. L. S. XVI. p. 141 (1877).
 Hdk. Irid. p. 12 (1892).
 *Goodale, Wild Fl. Am. p. 31 (1882).
 *Meehan, Fl. U. S. 1. p. 141 (1878).
 *Bureau of Plant Ind. Bull. 107, Plate II. fig. 4 (1907).
 *Niles, Bog Trotting, p. 28 (1904).

SYNONYMS.

- Xiphium versicolor* and *virginica*, Alef. in BZ. XXI. (1863), p. 297.
I. virginica, Linn. Sp. Plant. ed. 1. p. 39 (1753).
 *Bot. Mag. t. 703 (1804).
 *Tratt. Auswahl, no. 87 (1821).
I. caroliniana, S. Watson in Proc. Amer. Acad. XXV. (1898), p. 134.
 Baker, Hdk. Irid. p. 12 (1892).
 Gray, Manual, ed. VI. (1890), p. 514.
 Garden and Forest, 1893, p. 335.
I. caurina, Herbert in Hooker, Fl. Bor. Am. II. p. 206 (1840).
I. pulchella, Rgl. Gartenfl. 1859, p. 310.
I. flaccida, Spach, Hist. Vég. Phan. XIII. p. 41 (1846).

DISTRIBUTION. Swampy localities on the eastern side of North America from Hudson Bay to Texas.

- Hudson Bay*. Moose Factory, 1882, Haydon (K).
New Brunswick. Bass River, 1874, Fowler (E).
Prince Edward Island. Brackley Point, 1888, Macoun (BM).
Nova Scotia. Dartmouth, 1868, De Wolf (E).
Ottawa. 1886, Macoun (BM).
Central Canada. River Winnipeg, 18—, Richardson (BM).
 Lake Winnipeg, 1857, Bourgeau (E).
Minnesota. Nicollet, 1892, Ballard (E) (B) (BM).
 Hennepin Co., 1886 (E).
Michigan. Port Huron, 1896, Dodge (E).
Maine. St John River, 1893, Fernald (K).
 Bangor, 1905, Knight (E).
Massachusetts. 1832, Torrey (E).
 Boston, 18—, Booth (BM).
New Jersey. Gillette, Union Co., 1905, Mackenzie (E).
 Cranberry Lake, Sussex Co., 1904, Mackenzie (E).
 Camden, 1848 (E).
 Hudson Co., Union Hill, 1886, Rabenau (B).
New York State. Northbeach, Long Island, 1900, Henser (B).
 Sullivan Co., 18—, Singer (V).
Pennsylvania. 1834, Townsend (C).
 Harrisburg, 1888, Small (W).
Ohio. Cleveland, 1894, Krebs (B).
Indiana. Well's Co., Winter's Woods, 1903, Dean (B).
 Roby, 1906, Lansing (V) (B).
Illinois. Cahokia, 1901, Eggert (B).
 La Salle Co., Starved Rock, 1909, Greenman, etc. (B).
Columbia. Washington, 1897, Steele (E).
Virginia. Norfolk Co., 1898, Kearney (no. 1350) (W).
 North-west, 1898, Kearney (no. 1079) (W).
 No locality, 17—, Clayton (no. 259) (BM).
Kentucky. Lexington, 18—, Short (BM).
 Red River, 1834, Peter (K).
Missouri. Randolph, 1895, Mackenzie (K).
 St Louis, 1841, Riehl (BM), 1841, Geyer (V).
North Carolina. Eastern Part, 18—, Ashe (W).
Georgia. Chatham Co., McQueen's Island, 1904, Harper (no. 2180) (W) (E).
Texas. Orange, 1899, Bray (no. 61) (W).

Diagnosis.

I. versicolor Apogon: *I. pseudacorus* similis, sed segmenta interiora majora, oblanceolata; flores purpurei nec lutei.

Description.

Rootstock, a stout rhizome, with pink flesh, bearing the fibrous remains of old leaves.

Leaves, ensiform, more or less glaucous, often tinged with purple at the base, thickened along the centre, but not bearing a raised midrib.

Stem, $1\frac{1}{2}$ —2 ft. high, bearing a terminal head of 3 flowers and 2 or 3 side branches, each bearing 2 flowers and set in a large bractlike leaf. The uppermost lateral rises to the same height as the main stem.

Spathes, $1\frac{1}{2}$ —3 in. long, unequal, brownish at the edge but scarcely scarious, 2—3 flowered.

Pedicel, 1—2 in., of varying lengths in each spathe, but usually shorter than the spathes.

Ovary, small, oblong, triangular.

Tube, short, $\frac{1}{4}$ — $\frac{1}{2}$ in. long, greenish yellow.

Falls. The oval or suborbicular blade passes with a very slight constriction into the oblong, slightly oval haft, which bears two bosses at its base, as in *I. pseudacorus*. The colouring is produced by purple veins, either of a blue or red shade on a yellow ground along the haft, and on white on the lower part of the blade. The extremity of the blade is of a uniform purple colour. 2—3 in. long.

Standards. The oblanceolate unguiculate standards are not much more than half as long as the falls, and bear a pair of curious lateral flanges near the base, as in *I. pseudacorus*.

Styles, narrow, with a low, rounded keel, which is deeper in colour than the sides.

Crests, almost oblong, often revolute.

Stigma, a broad, triangular tongue.

Filaments, purplish.

Anthers, dark purple or violet.

Pollen, cream or yellow.

Capsule, oblong, obtusely trigonal, about $1\frac{1}{2}$ —2 in. long.

Seeds, flattened, with smooth light brown outer skins, much resembling those of *I. pseudacorus* and buoyant in water.

Observations.

In his first edition of the *Species Plantarum*, Linnaeus described as nos. 10 and 11, two American Irises under the names of *versicolor* and *virginica*. For the former he refers to two plants in Dillenius, *Hortus Elthamensis* (1732), t. 155, figs. 187 and 188, and also to Ehret, *Plantae Depictae* (1748), who gives a good figure of a red purple variety. It is curious, therefore, to find that, though Linnaeus included under *versicolor* the three forms just mentioned, he did not also include with them Clayton's no. 259 (BM), which is the type of Gronovius' *I. virginica* (Gron. Virg. p. 7). This plant is now in the Herbarium of the British Museum, and is obviously a form of what we know as *versicolor*, and cannot be separated from the specimen under that name in Linnaeus' own Herbarium at the Linnaean Society.

It is indeed hardly surprising that an Iris, whose habitat extends from Hudson Bay to the Gulf of Mexico, should be found to vary in different localities in colour, stature and size of flowers. The evidence of seedlings supports this view, and it seems unnecessary to keep up two distinct species. The name *versicolor* has priority in Linnaeus over *virginica*, which thus becomes a synonym of the former.

This Iris takes the place in America of *I. pseudacorus* in Europe. It is apparently as widely distributed as that species in similar positions, namely along streams and in marshy ground at the edge of water. Curiously enough, there are several structural affinities in the two species. The inflorescence is similar and so are also the rhizomes, capsules and seeds, and the bosses at the base of the falls. If we leave the colour out of consideration, the chief difference lies in the larger standards of *versicolor*.

The usual colour of the flowers of *I. versicolor* is a pale blue purple, but among seedlings there occur occasionally forms with flowers of a rich red purple, which is an approach to crimson. This form is often catalogued as a variety *kermesina*, and it is interesting to find that this colour apparently acts as a Mendelian recessive to the blue-purple colour. It is true that I have not yet flowered more than about two dozen plants from seed of self-fertilized *kermesina*, but of these plants every one has had the rich red purple colour that makes it so desirable a variety.

It is probable that a somewhat slender form of this Iris is common in Newfoundland, if it is true that a plant, which I owe to the generosity of Mr E. A. Bowles, comes from that island. It does not seem to me to differ in any essential from typical *I. versicolor*, except perhaps in the small size of the seeds. On the other hand, the plant from the Southern States described by S. Watson as *I. caroliniana* (in *Proc. Amer. Acad.* xxv. p. 134, 1898) is said to differ chiefly in the large size of the seeds. (It should be noticed that Baker by a curious oversight describes as

I. caroliniana [Hdk. Irid. p. 12] not that plant but the typical *I. versicolor* from which Watson was seeking to distinguish it.)

The cultivation of this Iris presents no difficulty, provided that it is grown in fairly rich soil, which is not allowed to become too dry in summer. It does not like lime, but small quantities are not so fatal to it as to other American species.

I. versicolor is one of the numerous Apogon Irises where self-fertilization is effected without the intervention of any insect. The tongue-like stigma bends down and backwards, and either collects pollen by actual contact with the protruding anther or picks it up from the haft of the fall. As in the case of other Irises, in which this phenomenon has been observed, the pollen is very easily jerked out of the sacs.

Seeds germinate very readily, and young plants should flower in their second season.

I. versicolor has become naturalized in a disused lock on the River Calder in Yorkshire. Specimens are in the Halifax Herbarium, and one was kindly sent to me by Mr W. B. Crump.

XI. The Hexagona Group.

This group consists of two or three species, according as we regard *I. foliosa* as specifically distinct from, or merely as a form of, *I. hexagona*. The other member is *I. fulva*, and all three agree in possessing the six-ribbed ovary and capsule from which the name was probably originally taken. They agree also in having a distinct pubescence on the central ridge and middle region of the falls, and a curious thick, cork-like covering to the seeds proper.

In the shape of the ovary and capsule (see Fig. 10) and in the pubescence on the falls this group seems to be an approach to *I. spuria*, and is possibly the American counterpart of the *spuria* group which is confined to Europe and Asia. Another link between the two groups lies in the sticky exudation from the base of the segments and from the perianth tube, which occurs also in *I. xiphium* (see Plates XVII and XLIII) and in the members of the *spuria* group.

Evidence of the affinity of *I. fulva* and *I. foliosa* is found in the fact that the former proved to be readily fertile to pollen of the latter. Moreover the hybrid, *I. fulvala*¹, has proved not to be entirely sterile, as is usually the case with hybrids between two widely separated species of Iris. On the other hand, we may take it that the two species are distinct, since the hybrid does not show "dominance" in any character, but is distinctly a compromise between the features of the two parents (see Plates XX and XXI). Thus the foliage neither dies away entirely in autumn like that of *I. foliosa*, nor remains green and of considerable length like that of *I. fulva*. For the young growths push up soon after the flowers are over and are 4 or 6 inches long in winter, while those of *I. foliosa* are still only 1 in. long, and those of *I. fulva* a foot at least. The stem is more like that of *I. fulva* than like that of the pollen parent, but it is sturdier. The flowers are of the shape of *I. foliosa*, with perhaps more rounded segments, and the colour is distinctly a compromise between the terra cotta of *I. fulva* and the blue-purple of *I. foliosa* (see Plates XX and XXI). The figure of a flower of *I. fulvala* shows the form in which the influence of the colour of *I. fulva* is most apparent. I have also from the same pod of seed other plants in which the shade of colour has distinctly more of the blue-purple of *I. foliosa* in it.

The cultivation of the members of this group is easy, with the exception of *I. hexagona*, which, as is explained in the Observations on that species, needs more warmth than it usually obtains in our English gardens to enable it to flower. In their native habitats *I. fulva* and *I. hexagona* are semi-aquatic, as may be readily seen from the structure of the leaves (see p. 15), but here in such conditions the rhizomes do not get that ripening which is essential to their well being. Consequently it is better to give these Irises rich soil and plant them in a well-drained and warm position. They must, however, not be allowed to get too dry during the growing season in spring and early summer.

They are best transplanted soon after the flowers have faded, as root growth is then active, and the plants become well established before winter.

The species may be differentiated as follows:—

I. fulva has long narrow leaves and broad, truncated and deeply emarginate standards, which are nearly as broad as the falls.

I. hexagona and *I. foliosa* are possibly indistinguishable as herbarium specimens. The typical *I. foliosa* is a very dwarf plant with a short stem hidden among the leaves. On the other hand, there seems to exist a whole series of forms growing gradually taller until we reach the large proportions of typical *I. hexagona*. As garden plants, the difference is more apparent, for the leaves of *I. hexagona* are distinctly greener and less glaucous than those of *I. foliosa*.

¹ The name was derived from *fulva* and *Lamancei*, by which *I. foliosa* is often known in gardens.



FIG. 10. Capsule of *I. fulva* (slightly reduced).

†*I. HEXAGONA*

Walt. Fl. Carol. p. 66 (1788).

Chapman, Fl. South. U.S. p. 472 (1860), ed. III. p. 500 (1897).

Baker in J. L. S. XVI. p. 141 (1877).

*in Bot. Mag. t. 6787 (1884).

SYNONYMS.

I. virginica, Michaux, Fl. Bor. Amer. i. p. 22 (1803), non Linn.

Pursh, Fl. Amer. Sept. 1. p. 29 (1814) ex parte.

[?] *I. carolina*, *Radius, Schriften der Naturforsch. Gesell. Leipzig, i. p. 158, t. 3 (1822)

DISTRIBUTION. The South Eastern United States.

(N.B. In some cases it is extremely difficult, if not impossible, to separate herbarium specimens of *I. hexagona* from those of *I. foliosa*).*Florida*. Tampa; Hillsborough Bay, 18—, Curtiss, no. 2852 (BM) (B) (K).

Seville; Cypress Swamp, 1901, Curtiss, no. 6754 (E).

St Augustine, 1848, Rugel (BM).

Louisiana. New Orleans, 1832, Drummond (no. 336) (K) (BM) (E) (V).(N.B. Drummond's no. 337 is *I. fulva*.)

New Orleans, 1844, Sallé (BM).

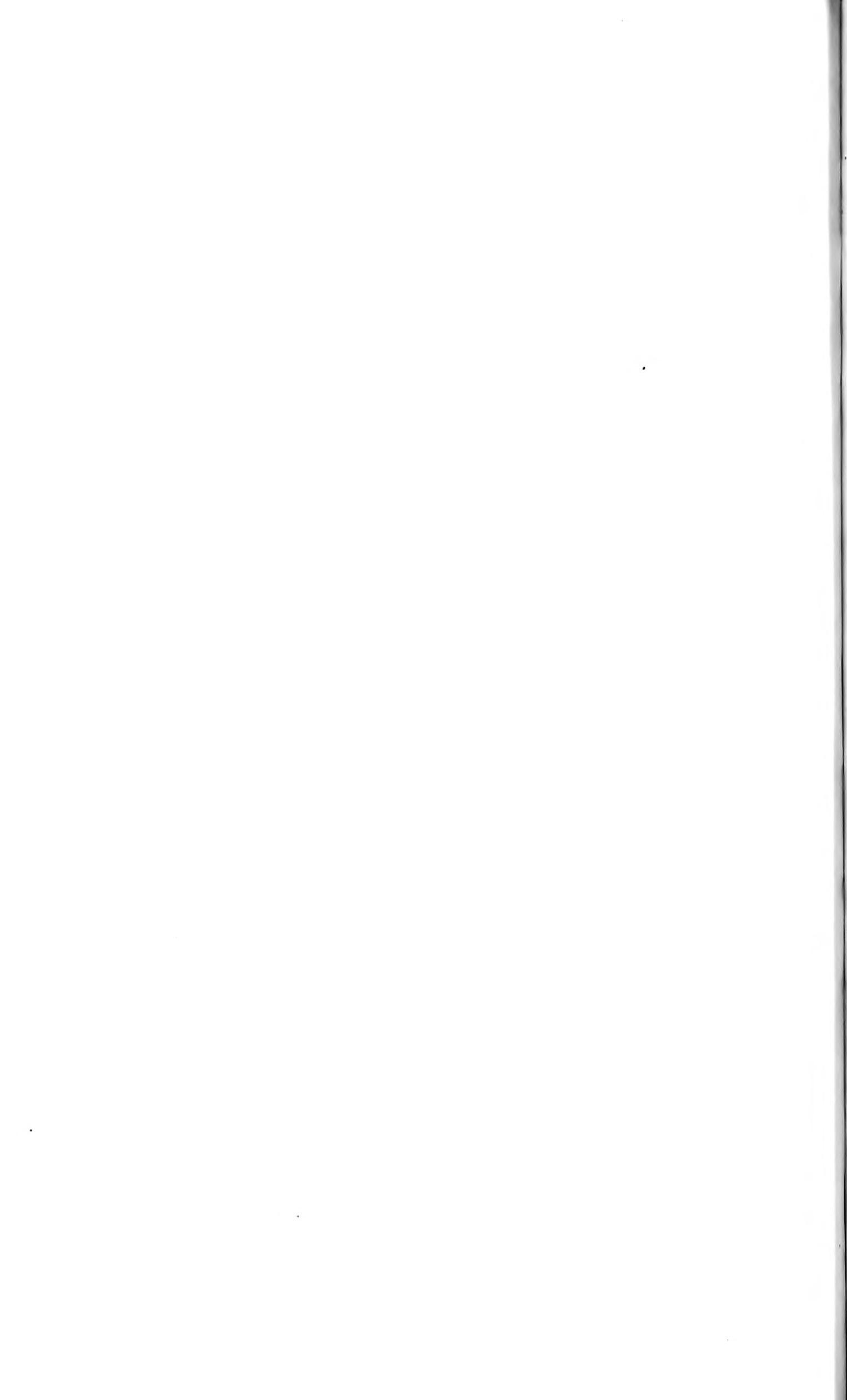
1832, Torrey (E).

1847, Bromfield (K).

*Diagnosis.**I. hexagona* Apogon; *folia* ensiformia, viridia; *caulis* foliosus, floribus in axillis insitis; *segmenta* interiora exterioribus multo angustiora, oblanceolata; *capsula* trigona, angulis profunde sulco bifidis ut fere hexagona.*Description.**Rootstock*, a stout greenish rhizome, somewhat resembling that of *I. fulva*, very wide creeping, often 1—2 ft. in length.*Leaves*, ensiform, slightly glaucous, 1 in. broad by 2—3 ft. long, remaining more or less green throughout the winter.*Stem*, 3 feet or more in height, bearing 3—4 heads of flowers, each branch being wrapped in a long, sheathing, bractlike leaf.*Spathes*, 2—3 flowered; one outer valve of the terminal cluster is bractlike, 6—8 in. in length, the other being narrow, pointed, green, closely clasping the tube, 4 in. in length; the inner valves are membranous.*Pedicel*, about one inch.*Ovary*, trigonal with concave sides, with a groove running down each angle.*Tube*, with many grooves, 1—1½ in. long.*Falls*. The greenish haft is separated by a constriction from the obovate blade, and bears a well-marked central ridge. This ridge is greenish at the base, but becomes yellow as it approaches the blade, and is covered with a distinct pubescence, which extends on either side of the ridge. The blade is of a pale or dark lilac (or even white), 4—4½ in. long by nearly 2 in. in width.*Standards*, erect, oblanceolate; the haft is veined with green, and the blade is either lilac (or white). 3½ in. long by ¾ in. broad.*Styles*, narrower than the haft of the fall, very convex laterally, greenish, with a central well-marked reddish lilac ridge.*Crests*, lilac, triangular, with coarsely serrated edge.*Stigma*, bifid, with two triangular teeth.*Filaments*, green, very short.*Anthers*, greenish, the pollen sacs narrow, three times as long as the filament.*Pollen*, grains rounded oval, with a fissure down one side.*Capsule*, with six ribs, somewhat resembling that of *I. spuria*, but with the six ribs set almost at equal distances, and not in pairs at the angles.*Seeds*, very large, more or less D-shaped, with a thick spongy covering to the seed proper, closely resembling that of *I. fulva* (see Plate XLVIII, Fig. 3).*Observations.*

This fine Iris and the next, *I. foliosa*, are obviously closely allied, and it would scarcely be surprising to find that they proved to be merely different combinations of certain Mendelian pairs of characters. Here in England we labour under a disadvantage with regard to the solution of this question, for, as far as I know, a certain sheltered corner in a bay between the greenhouses in the Cambridge Botanic Garden is the only place where the tall form that is commonly known as *I. hexagona* has flowered out of doors in England. Moreover, *I. foliosa*, though it flowers with me every year,







rarely sets seed even when carefully pollinated, and attempts to work out the relationship of these two plants have therefore proved fruitless.

I. hexagona is worth some trouble, for it is a magnificent Iris with broad foliage and stems over 3 feet high. Like other aquatic Irises from hotter climates than ours, it is better suited in rich soil in a comparatively dry and warm position than in the bog garden, where it would probably live but refuse to flower. The rhizomes grow very strongly, and increase to a considerable length. Herein lies one of the difficulties of cultivating *I. hexagona* under glass, for it needs an extensive root-run. If it must be grown in pots, then the rhizomes must be allowed to grow over from one pot into another, and when the growing point is well established in the second, the old rhizome in the first may be cut away.

From the evidence of herbarium specimens there is little doubt that this Iris varies considerably in stature in different localities. It is, indeed, owing to this variability that it is impossible to separate this Iris satisfactorily from *I. foliosa*. On trying to work out the distribution by means of the Kew specimens, I found that the two species were very irregularly distributed, but on my invoking the aid of Dr N. L. Britton, of the New York Botanical Garden, who happened to be at Kew at the time, it was a relief to find that such an irregular distribution was no surprise to him, and that many other species of plants have similarly confused habitats in that part of the United States.

It is much to be hoped that seeds of this Iris from various localities may be obtained in England, and forms raised that may prove as hardy with us as *I. foliosa*.

⁴⁴*I. FOLIOSA*

(PLATE XX)

Mackenzie and Bush in Trans. Acad. Sci. St Louis, XII. p. 81 (1902).

SYNONYMS.

I. coelestina, Nuttall MS. (BM).

(This specimen was collected in Arkansas and is most probably *I. foliosa* and not *I. hexagona*.)

I. hexagona var. *Lamancei*, Gerard (cf. Garden and Forest, 1895, p. 329, 1896, pp. 276 and 408).

I. hexagona, Elliot, Bot. South Carol. I. p. 46 (1821).

(The plant here mentioned was collected at Ogechee and has a flexuous stem, shorter than the leaves and was therefore presumably *I. foliosa*.)

DISTRIBUTION. The South Eastern United States.

(N.B. In some cases it is extremely difficult, if not impossible, to separate herbarium specimens of *I. foliosa* from those of *I. hexagona*, cf. especially the Texas specimens.)

Missouri. Independence, 1889, Bush (K).

Arkansas. In Garden and Forest for 1895, p. 329, Lora La Mance gives an account of the first discovery of two flowerless examples of this Iris on a rocky ledge in Benton Co., Arkansas. The depth of soil was only about six inches and only the two plants collected were seen.

Kentucky. Lexington, 18—, Short (K).

1838, Peter (V).

Illinois. Carlinville, 1891, Andrews (K).

Texas. Galveston Bay, 18—, Drummond (K).

Rio Brazos, 1835, Drummond (K).

[N.B. These Texas specimens are almost intermediate between *I. hexagona* and *I. foliosa*.]

Diagnosis.

I. foliosa Apogon; *I. hexagona* valde similis, sed *folia* glaucescentia; *caulis* nanus.

Description.

Rootstock, a pale buff-coloured rhizome with greenish rings.

Leaves, glaucous green, ensiform, 18 in. long by 1 in. broad, dying down completely in the autumn. New shoots appear almost at once, but do not grow until the spring.

Stem, very short, not more than six inches, so that the flowers are hidden among the leaves.

Spathe valves, lanceolate, green, 2 in. long.

*Pedice*l, short, $\frac{1}{2}$ in.

Ovary, triangular, with a double ridge at each angle. $\frac{1}{2}$ in.

Tube, about $\frac{3}{4}$ in. long, yellow, with pale greenish yellow ribs.

Falls. The ovate blade is as long as the narrowly cuneate haft. The latter is greenish, with a distinctly downy ridge extending on to the blade, as in *I. hexagona*. The blade is of a fine blue-purple, except for a triangular patch of greenish-white about the end of the ridge. The pubescence extends over this patch. The haft is veined with green or green-white. $3\frac{1}{2}$ in. by $1\frac{1}{4}$ in.

Standards, ob lanceolate, pale blue-purple, with a greenish haft. $2\frac{1}{2}$ in. by $\frac{5}{8}$ in.

Styles, keeled, greenish, $1\frac{3}{4}$ in. long.

Crests, $\frac{1}{2}$ in. long, quadrate, very pale lavender.

Stigma, with two large lobes.

Filaments, about equal to the anthers, but usually rather shorter, greenish.

Anthers, long and narrow cream, the sacs being widely separated.

Pollen, yellowish white, much more sharply pointed than that of *I. hexagona*.

Capsule, globular, more than an inch in length, and nearly as wide.

Seeds, resembling those of *I. hexagona*, but slightly smaller.

Observations.

This is the Iris that has been known in gardens for some years as *I. hexagona* var. *Lamancei*. It would perhaps have been better to keep this varietal name, but unfortunately, although Lora S. La Mance's note in Garden and Forest (l.c.) states that the plant was named by Mr J. N. Gerard, no description was apparently published. Even though there is no absolute proof that Gerard's *Lamancei* and Mackenzie and Bush's *foliosa* are identical, there can be little doubt that both names were given to the same plant.

I. foliosa is well named, for it almost hides its curiously flexuous stems among the luxuriant foliage, which is more glaucous and less distinctly that of an aquatic Iris than the leaves of *I. hexagona*. Its rhizomes spread very quickly, and need to be transplanted soon after the flowers have faded every two or three years. The soil should be rich in humus, and not too dry in the spring and early summer.

The question of the relationship of *I. foliosa* to *I. hexagona* has already been discussed under the Observations on the latter, and it only remains to add here that the few seedlings of *I. foliosa* that I have been able to raise have reproduced the dwarf habit and other characteristics without any noticeable variation.

A very beautiful white-flowered form has lately been introduced into our gardens, but it is not known whether this was found wild or whether it is of garden origin. The white flowers are somewhat faintly tinged with pale purple, and in this respect resemble the albino forms of *I. laevigata* and *I. sibirica*.

The pollen of *I. foliosa* has been used to fertilize *I. fulva*, and the description of the resultant *I. fulvala* (see Plate XXI) will be found in the note on the *hexagona* group (see p. 81).

††*I. FULVA*

(PLATE XXI)

*Ker Gawl in Bot. Mag. 1496 (1812).

[The type is in Hb. K.]

*Geel. Sert. Bot. vol. 1. (1830).

*Reich. Fl. Exot. fig. 38 (1834).

Baker in J. L. S. XVI. 142 (1877).

Hdk. Irid. p. 14 (1892).

SYNONYMS.

I. cuprea, Pursh, Fl. Amer. Sept. 1. 30 (1814).

*Carrington Ley in The Garden, 1898, p. 518, t. 1175.

Iris fulva, Tratt. Auswahl Gartenpfl. t. 112 (1821).

Neubekia fulva, Alefield, BZ. XXI. 1863, p. 296.

DISTRIBUTION This curious Iris is limited apparently to the Mississippi valley in the neighbourhood of New Orleans.

New Orleans (Algiers), 1847, Bromfield (K).

Riddell (K) (C).

1832, Drummond, no. 337 (K) (BM). (N.B. Drummond's no. 336 is *I. hexagona*.)

Diagnosis.

I. fulva Apogon; *I. hexagonae* haud dissimilis; sed *segmenta* interiora truncata, emarginata, exterioribus subaequalia. *Colore* etiam omnino differt.

Description.

Rootstock, a stout rhizome, showing ring-like marks where the leaves of former years have been attached, of a pale greenish brown.

Leaves, bright green, ensiform, the upper third reflexed, 2 ft. or more long by 1 in. wide; the plant is practically evergreen.

Stem, 2 ft. or more in height, bearing a terminal head of 2 flowers, and 2 side-flowers set in the axils of reduced leaves.

Spathe valves, narrow, pointed, 2—4 in. long, the outer sheaths being green and persistent, unequal.

Pedicel, about 1½ in. long.

Ovary, six-ribbed, as in *spuria*, but with the ribs at more equal intervals, shorter than the tube, green.

Tube, yellowish, ¾—1 in. long, quite hollow right down to the ovary.

Falls, oblanceolate cuneate, of a deep terra cotta colour, with veins of a deeper colour, especially along the centre of the blade, 2½ in. by 1 in.





Standards, broad, truncated, deeply emarginate, of the same colour as the falls, 2 in. by $\frac{3}{4}$ in.

Styles, short, under 1 in. long, convex, unkeeled.

Crests, small, rounded, triangular, with minutely serrate edge.

Stigma, with two pointed teeth, not prominent.

Filaments, yellowish, short.

Anthers, cream, reaching stigma.

Pollen, cream.

Capsule, very large, 2 in. long by an inch or more broad. Six-ribbed, with 3 broad and 3 narrow surfaces, each of which bears a slight ridge down the centre, remaining green, even when the seeds are ripe (see Fig. 10, p. 81).

Seeds, with a thick spongy covering, irregular, with flat sides, very large, $\frac{1}{4}$ — $\frac{3}{8}$ in. in length (see Plate XLVIII, Fig. 3).

Observations.

This Iris stands quite alone in the colour of the flowers, which is bright copper or terra cotta (see Plate XXI). Another curious feature is that, although when the flower first opens the segments all droop as in the drawing, yet on the following days they become much less pendulous, though still spreading rather than erect.

Herbarium specimens of this Iris are only with difficulty distinguished from examples of *I. hexagona*, unless it is possible to see the shape of the standards, which in *I. fulva* are much broader and more obtuse, or the very narrow, short style-branches, and minute crests.

The leaves of this Iris show distinctly by their structure that it is an aquatic species, but it remains flowerless, if treated as such in England. It requires here a somewhat dry and warm position in rich light soil.

It should be transplanted soon after the flowers have faded, and is much hardier in the climate of the greater part of England than is *I. hexagona*.

XII. *I. ensata*.

This widely distributed Asiatic species seems to stand so entirely alone as to demand separate treatment. Its peculiarities will be found in the Observations at the end of the account of the species. The most striking features are the long, narrow ovary and capsule, and the extremely short perianth tube.

⁺⁺*I. ENSATA*

- Thunb. Trans. Linn. Soc. II. p. 328 (1794).
- *Gartenflora, t. 1011 (1880) (var. *chinensis*).
- t. 1452 (1898) (var. *pabularia* Naudin).
- Baker in J. L. S. XVI. p. 139 (1877).
- Hdk. Irid. p. 8 (1892).
- Maxim. in B. A. P. XXVI. p. 512 (1880).
- Mél. Biol. x. p. 699 (1880).
- Boiss. Fl. Or. V. p. 127 (1884).
- Franchet, Plant. David. I. p. 297 (1884).
- *Somoku Zusetsu, II. no. 7 (Japon. neji-ayame).

SYNONYMS.

- I. lactea*, Pallas, Iter. III. p. 713.
- [From Lake Tarei (BM).]
- I. an spuria?* Pallas, l.c. t. c. fig. 1
- [From Transbaikalia (BM).]
- I. caespitosa*, Pallas MS. (BM).
- I. caricifolia*, Pallas MS. (BM).
- Roem. and Schult, Sys. Veg. I. p. 318 (1817)
- Link, Jahrb. I. 3, p. 72 (1820)
- I. graminea*, Thunb. Fl. Jap. p. 34 (1784), non Linn.
- I. triflora*, Balbis, Misc. Bot. 6, t. 1 (1804).
- [Specimens (K) (BM).]
- *Red. Lil. t. 481 (1816).
- I. biglumis*, Vahl, Enum. II. p. 149 (1806).
- *Sweet, Brit. Flower Gard. Ser. II. vol. II. t. 187 (1833).
- [Specimens from Dahuria (K).]
- I. haematophylla*, Link. Enum. hort. Berol. I. p. 60 (1821), non Fischer
- I. Pallasii*, Fischer in Trev. Ind. Sem. Hort. Vratisl. (1821).
- *Rehb. Ic. crit. v. t. 479, Fig. 672 (1827).
- *Bot. Mag. t. 2331 (1832).
- var. *chinensis*, Fischer in Bot. Mag. t. 2331 (1832).
- I. longispatha*, Fischer in *Bot. Mag. t. 2528 (1825).
- I. Moorecroftiana*, Wall. Cat. no. 5051 (1828) (Specimens in LS).

- I. oxyptala*, C. A. Meyer in Ind. Plant. Mus. Acad. Petrop. II. p. 8 (1834), ex Led. Fl. Ross. IV. 99 (1853).
I. longifolia, Royle, Illust. Bot. Him. p. 372, t. 91, fig. 2 (1839).
I. fragrans, Lindley, Bot. Reg. XXVI. t. 1 (1840).
I. Doniana, Spach, Hist. Vég. Phan. XIII. p. 34 (1846).
Xiphon Pallasii and *Donianum*, Alef. in BZ. XXI. p. 297 (1863).
Ioniris bighumis, *Doniana fragrans*, *longispatha*, *triflora*, *Pallasii*, Klatt in BZ. XXX. pp. 502, 503 (1872).

DISTRIBUTION. Central Asia, Kashmir, China and Corea.

- Central Asia*. Suidun, 1879, Regel (V).
 Altai, 1873, Hb. Shuttleworth (BM).
 Dahuria, 17—, Pallas (BM) (LS).
 1831, Turczaninow (K).
 Saisan Nor, 1876, Waldberg-Zeil (B).
Kashmir and N.W. India. Ladak, 1856, Schlagintweit (B) (BM).
 1880, Edgeworth (K).
 Gilgit, 1886, Giles (K).
 1847, Winterbotham, no. 399 (K).
 Lahul, 1865, Jaeschke (K).
 Pangl, 1879, Heyde (BM).
 Jhelum Valley, 1892, Duthie (BM).
 1875, Clarke (BM).
 Srinagar, 1876, Clarke (K).
 1901, Duthie's collector (K).
 1908, Harrison (HortD).
 Baramula, 18—, Jacquemont (K).
 1901, Duthie's collector (E).
 Indus Valley, 1847, Hb. Hooker (K).
China. Sinkiang, Kuldscha, 1877, Regel (K).
 Kashgar, 1911, Meyer (HortD).
 1774, Bellew (K).
 Hami, 1881, Mesny (BM).
 Songaria, 18—, Schrenk (K).
 Tianschan Mts, 1877, Potanin (K) (E).
Mongolia; Upper Yenesei; Ulu-kem, 1910, Price, no. 475 (K).
 Gobi, 1886, Potanin (K).
 Achcet Basin, 1910, Price, no. 114 (K).
 Lake Ubsa, 1879, Potanin (K) (E) (V).
 Khirgis Nor, 1879, Potanin (K).
 R. Hoangho, 1872, Przewalski (K).
 Upper Irtysh; Kobu Valley, 1910, Price, no. 178 (K).
 East Mongolia, 1901, Campbell (BM).
 Ala Schan, 1873, Przewalski (E).
 Suma-chada, 1871, Przewalski (V).
 Tibet, no locality, 1884, Przewalski (K).
 Gyantze, 1904, Walton (K).
 1908 (HortD).
 W. Szechuan; Min Valley, 1908, Wilson, no. 1181 (K).
 Hupeh; Changyang, 1900, Wilson, no. 729 (B) (K).
 Fukien; Foochow, 1883, Wykeham Perry (K).
 Chihli; no locality, 1884, Potanin (V).
 Gehol, 1882, David (K).
 Peking, 1866, Williams (BM).
 1880, Hancock (K).
 1881, Bretschneider (BM).
 1882, Carles (BM).
 1887, Bullock (K).
 1889, Bodinier (L).
 1906, Schindler (B).
 Shantung; Tsing-chow-fu, 1895, Couling (E).
 Kiao-chow, 1910, Haas (HortD).
 Manchuria; Mukden, 1887, Webster (K).
 Kirin, 1896, Komarov, no. 421 (K).
Corea. West Coast, 1883, Wykeham Perry (K).
 Tchao-Tchao, 1905, Chonet (E) (L).
 Seoul, 1909, Taquet (L).
 Taikae, 1906, Faurie (L).
 R. Talu, 1897, Komarov (BM).

Diagnosis.

I. ensata Apogon; *folia* linearia, glaucescentia, striata; *caulis* foliis maturis multo brevior, monocephalus; *spathae* multiflorae, acuminatae, angustae, virides; *pedicelli* longi; *capsula* anguste oblonga, hexagona.

Description.

Rootstock, a compact, close-tufted rhizome, covered with coarse remnants of old leaves, resembling those of *I. spuria* and *I. longipetala*.

Leaves, linear, $\frac{1}{4}$ — $\frac{1}{2}$ in. broad, length varying from a few inches at flowering time to 18—24 in. eventually, finely ribbed, of a glaucous grey.

Stem, 2—12 in. long, flattened so as to be lozenge shape in section, bearing a single terminal head.

Spathes, narrow, acuminate, green, usually 2—3 in. long, but sometimes much longer.

Pedicels, of varying length even in the same spathe, $\frac{1}{2}$ —4 in.

Ovary, 1—2 in. long, narrow, more or less trigonal, with two furrows on each face, usually twisted and passing gradually into the pedicel.

Tube, very short and easily detached from the top of the ovary when the flower withers.

Falls. The oblanceolate blade is separated by a slight and gradual constriction from the slightly panduriform haft. The colour varies considerably, from pure white with a few slight greenish veins to dark blue- or red-purple. In some cases the veining is very delicate and beautiful. On the haft the low central greenish-yellow ridge is often dotted with small purplish dots.

Standards, oblanceolate unguiculate with a canaliculate haft; the colour is usually darker than that of the falls and the back of the haft is greenish.

Styles, narrow, rounded, not sharply keeled.

Crests, triangular, overlapping.

Stigma, a small, pendant triangular tongue.

Filaments, white, short.

Anthers, cream, longer than the filaments.

Pollen, cream.

Capsule, 2—3 in. long, narrowly oblong, with six ribs at equal intervals and a short sharp beak (see Fig. 11).

Seeds, globose, bark brown, smooth-skinned, somewhat resembling those of the *longipetala* group.

Observations.

This *Iris* extends from the Altai region to Shantung and Corea, and appears to have several local forms. Any attempt to arrive at a clear and complete classification of these forms is made the more difficult by several facts. In the first place, the slender rhizomes will not survive complete desiccation, and almost invariably succumb during the long journey to England from Central Asia. The surest method of introducing the various forms is therefore by means of seeds, which are freely produced and germinate readily. Unfortunately the plants do not begin to flower until, after three or four years, they have grown into clumps of some size.

Another difficulty lies in the fact that the specimens found in herbarium collections have usually been gathered either at the flowering time or when the capsules of seed had developed. Between these two periods the foliage grows considerably, with the result that the plants appear quite different.

The task of endeavouring to assign definite localities to the different forms of this *Iris* is probably further complicated by the fact that it has in Central Asia some importance as an economic plant. In Kashmir, for instance, the foliage is used as fodder (cf. *Gartenflora*, 1898, p. 370), while in the neighbourhood of Kashgar it is woven into cord, and bunches of vegetables and of grapes are mostly tied with it. We are bound to admit therefore that the *Iris* may now have become naturalised in many places where it was not originally indigenous. In this connection it may be noted that Maximowicz, who endeavoured (vide l.c.) to distinguish three varieties, was obliged to state that all three were collected by Regel at Kuldscha.

The economic value of *I. ensata* is doubtless increased by the fact that, owing to its deep rooting character, it is less affected by long periods of drought than any other *Iris*. This was very noticeable in September 1911, when the foliage of nearly all other *Iris*es had withered away. The clumps of *I. ensata* remained quite green until they were cut down by frost. This peculiarity allows the plant to flourish where other vegetation fails, and I have seen photographs taken near Kashgar of a district where the ground is covered with great clumps of *I. ensata* many feet in circumference, and where the bare, deeply fissured hills afford abundant testimony to the aridity of the climate.

Although it is impossible to come to any definite conclusion as to the number of really distinct forms of this species that may exist, there are at least three which should not be confused with one another, but which, at the same time, cannot be separated into distinct species.

Of these three forms, by far the commonest is that which has flowers with narrow oblanceolate falls and foliage which at length attains nearly, if not quite, to two feet in length. The flower stems are of variable length even on the same plant, and the relative proportions of the stem and of the



FIG. 11. Capsule of *I. ensata*.

leaves are not constant under different climatic conditions. Of this a striking illustration was afforded by the difference between Wilson's specimen from the Min valley in Szechuan (No. 1181) and a plant raised from seed brought home from that locality by Wilson himself. In China the flowers appear when the leaves are very short¹, and this actually occurred in some plants of *I. ensata*, which came into flower soon after Christmas 1911, during a spell of mild weather following on the thorough ripening that the summer's drought had given the plants. In England, the plants usually do not flower until May or June, when the foliage has already grown to 12—18 inches, and when the stems are consequently much overtopped by the leaves.

This variety of *I. ensata*, which I take to be the typical form, has grown in my garden in the form either of imported plants or of seedlings raised from seeds from the following localities:—Japan, Szechuan (Wilson no. 1181, 1908), Shantung, Kashmir.

The second form, which I propose to call var. *grandiflora*, has much larger flowers, the falls being obovate rather than oblanceolate. The ground colour is a pale creamy primrose, delicately veined with pale violet. At the edge the veins become diffuse and spread over the whole surface. The standards are also broad and of the same pale violet colour. For some reason this Iris is often known in catalogues and in gardens as the variety *oxypetala*, to which name it has, of course, less claim than any other known form of *I. ensata*. The only specimens of this Iris that I have obtained from a known locality are a hatch of plants raised from seeds sent from Gyantze in Thibet and handed on to me by the generosity of the late W. E. Gumbleton.

The third form of this Iris is one which I have raised from seeds sent to me by Mons. H. Correvon, but without any guarantee of their exact provenance. All the plants that I raised agree in having short, stiff leaves, with a distinct corkscrew twist, which differentiates them at once from the leaves of the other forms, when all are grown side by side.

The flowers of this third form closely resemble those of the typical plant, except that the veining extends further over the blade of the falls, which expand rather more suddenly and then narrows to a pointed tip. I am inclined to think that this may be the variety *chinensis*, which grows abundantly on the plains round Pekin. As herbarium specimens it is impossible to separate this variety from the typical plant, and it is only occasionally that the variety *grandiflora* displays its flowers sufficiently well in the dried state to allow of its being separated from the other varieties. Pallas' specimens (BM) appear to belong to this variety.

Specimens of *I. ensata* are very common in herbarium collections, often erroneously identified. The stems are so variable in length, both absolutely and in proportion to the leaves, and the appearance of the plant at flowering time is so totally different to that which it has assumed by the time the capsules of seed are mature, that such confusions are almost unavoidable until we are acquainted with the peculiarities of the living plant.

In the dry state, the distinguishing features are the narrow finely-ribbed leaves, often flushed at the base with purple, which becomes a deep brown in the course of time, the slender rhizome closely covered with coarse, but not fibrous, remains of old leaves and not unlike the rhizome of *I. spuria*, the long, narrow, obscurely-ribbed and usually slightly twisted ovary, and the long, narrow, six-ribbed capsule, supported on a long pedicel (see Fig. 11, p. 87).

These characters are common to all the known forms, and serve to distinguish them from any other species.

In cultivation the plant presents no great difficulty. *I. ensata* will grow in any soil, either in sand or in heavy clay, and is moreover unlike some other apogons, in that it has no dislike to lime in the soil. Not only is this true in England, but I have found that the soil still remaining attached to the roots of plants that have reached me from Central Asia is often strongly impregnated with lime. When growth begins in spring, the young leaves appear of a pale yellow, as though they had been blanched and only gradually turn to the somewhat grey shade of green that they subsequently assume. After flowering, the leaves still grow considerably. In some cases they are stiff and upright and grow with a curious spiral twist; in others the length is greater and the leaves droop until their tips almost touch the ground. They remain green until quite late in the autumn, in fact until they are cut down by sharp frosts, when they turn to a peculiarly dirty, brownish black, wholly unlike the various shades of yellow or red-brown found among the withered leaves of other species.

The only species to which *I. ensata* seems to show any affinity are the Western American *I. longipetala* and its relatives *I. missouriensis* and *I. montana*. With these it agrees in the characters of the rhizome and, to some extent, of the foliage and capsule (the latter being, however, much narrower in *I. ensata*). The seeds, also, are all of the same type, although those of *I. ensata* are so much smaller and more spherical as to be readily distinguishable from those of the American species. It is possible that the Chinese *I. Grijsi* is also allied to *I. ensata*, but our ignorance of the seeds and capsules of the former makes it impossible to ascertain whether there is any real relationship between the two species.

¹ This is proved by many herbarium specimens.

XIII. The *Longipetala* group.

In this group, which probably comprises two species and one subspecies, there has been considerable confusion. *I. longipetala* comes from the Pacific coast, and has a sturdy stem and a many flowered spathe. It is largely evergreen in winter, probably in its native home and certainly in England, owing to its habit of throwing up new leaves in the autumn. This Iris is never found apparently at any great distance from the Pacific, but there is a mountain or upland form, which differs only from *I. longipetala* in its more slender growth and shorter leaves, which moreover do not begin to grow until the spring. Nuttall's specimen (BM) leaves no doubt that it was to this plant that he gave the name of *I. missouriensis*. The flowers are practically identical with those of *I. longipetala*, though perhaps somewhat more slender. Both plants, however, possess the short yellowish-green perianth tube which springs from the ovary with hardly any perceptible constriction. It was to this same upland form of *I. longipetala*, for it can hardly be looked upon as a distinct species, that Herbert gave the name of *I. tolmeiana*. His type-specimens still exist in the British Museum, and I have no doubt that this name is merely a synonym of *I. missouriensis*. Confusion has arisen because this plant has also been described and figured under the name of *I. longipetala montana*. The name was taken presumably from a sheet of specimens from Nuttall in the British Museum labelled *montana*, though Nuttall probably never published the name. His plants, however, are quite distinct from *I. missouriensis*. They have the relatively shorter stem, the pointed and not obtuse, emarginate standards, and the slightly longer, narrower and darker perianth tube possessed by the Iris figured at Plate XXII. For this species it seems best to retain Nuttall's name *montana*, because the name has already been applied for some time to one member of the group. Nuttall undoubtedly saw the difference between *I. missouriensis* and *I. montana*, and we owe it to him to retain his names.

As garden plants, *I. missouriensis* and *I. montana* are quite easily separated, but in dealing with herbarium specimens it is often impossible to say with confidence to which species we must assign them. If the tips of the standards are visible, it is easy to separate them, for *I. montana* has pointed standards differing at a glance from the blunt, emarginate tips of the standards of *I. missouriensis*. The latter has usually more flowers than two in the spathe, and the pedicels are longer, while *I. montana* only rarely produces a third flower.

The habitats of *I. missouriensis* and *I. montana* are, roughly speaking, west and east of the Rocky Mountains, but a careful study of available specimens seems to show that, though in the north the dividing line follows the watershed through Montana, Wyoming and Colorado, there is in New Mexico an extension of *I. missouriensis* in a south-easterly direction, which cuts off some colonies of *I. montana* in Arizona—particularly in the neighbourhood of Flagstaff—from the main body in Eastern Colorado and Wyoming. I have it on the authority of Dr N. L. Britton, the Director of the New York Botanical Garden, that such south-easterly extensions of the habitats of plants belonging to the flora of the Great Basin are not uncommon, and I have therefore less hesitation in giving *I. montana* specific rank. Its characters are constant under cultivation and in successive generations.

It must be confessed, however, that with herbarium specimens alone it is impossible to work out the exact distribution of these two species. I have tried to identify as many specimens as possible, but I am not always confident that the identification is correct.

The cultivation of the members of this group is easy. They appear to succeed in almost any soil, but do best, perhaps, in a rather heavy loam. This may, however, be merely due to the fact that in such a soil a plant does not soon exhaust the stock of food within reach of its roots, and for some reason or other all these species do best when left undisturbed to form large masses. In a light soil two or three years of luxurious growth impoverishes the soil to such an extent that, unless liberal top-dressing in autumn and winter is carried out, the plants begin to fail and become less floriferous.

Some very good garden hybrids of *I. montana* crossed with pollen of *I. longipetala* were raised by Foster, and are now in commerce under the name of Tollong, *I. tolmeiana* being the name by which Foster knew *I. montana*.

The three plants that form the group may be separated as follows:—

Plant sturdy, spathes many flowered, pedicels long, standards blunt emarginate, mature leaves as long as or longer than the stem.	<i>I. longipetala</i> (p. 89).
Plant slender, spathes many flowered, pedicels long, standards blunt emarginate, mature leaves shorter than the stem.	<i>I. missouriensis</i> (p. 90).
Spathes usually only two-flowered, pedicels short, standards oblanceolate pointed, mature leaves longer than the stem.	<i>I. montana</i> (p. 91).

†† *I. LONGIPETALA*

Herbert in Hooker and Arnott, Bot. Beech. 395 (1841).

*Hooker, f. in Bot. Mag. t. 5298 (1862).

Baker in J. L. S. XVI. 142 (1877).

Hdk. Irid. 10 (1892).

DISTRIBUTION. This Iris is only found near the sea-coast of California, in the region of the liberal winter-rains and heavy summer sea-fogs. It is plentiful in the meadows about San Francisco Bay and extends as far south as Monterey.

California, 1833, Douglas (BM) (K) (V).

18—, Beechey (K).

San Francisco Bay, 1848, Hartweg (K) (BM).

1868, Kellogg and Harford (BM).

Santa Cruz, 1879, Isaman (K).

San Mateo Co., 1902, Baker (K) (V).

Belmont, San Mateo Co., 1900, Elmer (V).

Monterey, 1861, Guirado (K).

Diagnosis.

I. longipetala Apogon; *folia* linearia vel anguste ensiformia, caulem paullo superantia; *caulis* monocephalus, vel nonnunquam ramo singulo instructus; *spathae* multiflorae; *pedicelli* primo inter se inaequales, denique subaequales, spatharum valvas longe superantes; *segmenta* interiora exterioribus aequilonga, obtusa, valde emarginata.

Description.

Rootstock, a short creeping rhizome, with brown sheaths at the base of the leaves.

Leaves, firm, narrow ensiform, about 18—24 in. long by $\frac{1}{2}$ — $\frac{3}{4}$ wide, varying in individual plants and not dying down in winter, the new leaves appearing before the old wither, of a dark grey green with glaucous sheen.

Stem, 2 ft. high, sometimes bearing two or three reduced leaves, and sometimes one or two lateral heads of flowers besides the terminal cluster.

Spathae valves, 3—4 in. long, the outer valves being green, lanceolate, 3—6-flowered. The outermost valve is often and indeed usually set 2—3 in. below the next.

Pedicels, 1—3 in. long, those of the various flowers being of different lengths at flowering time, but becoming equal later.

Ovary, oblong, trigonal, $\frac{3}{4}$ —1 in. long, with a somewhat rough uneven surface, and a ridge down each side.

Tube, about $\frac{1}{4}$ in., funnel-shaped, green, faintly striped with purple in the line of the standards.

Falls, obovate unguiculate, spreading and drooping rather than reflexing. The central ridge or keel is flanked with yellow, and finely dotted with purple. There are also a number of small deep purple dots about the end of this ridge on the blade, which is white, finely and conspicuously veined with violet, as is also the haft, $2\frac{1}{2}$ —3 in. by $1\frac{1}{2}$ in. Nuttall's statement (l.c.) that the falls are yellow is probably due to the fact that he was describing a dried specimen.

Standards, somewhat divergent, blunt, broadly emarginate, oblong-unguiculate, $2\frac{1}{2}$ —3 in. by $\frac{3}{4}$ in., white, with violet veins more diffuse, and somewhat paler than those on the falls.

Styles, $1\frac{1}{2}$ in. long, narrow at the base, becoming wider above, pale violet.

Crests, almost quadrate, with irregularly indented edge.

Stigma, obscurely bilobed.

Filaments, equal to anthers, white mottled with pale violet.

Anthers, purple.

Pollen, creamy white.

Capsule, $\frac{3}{4}$ in. by $1\frac{1}{2}$ —2, tapering at either end, with six ribs set at equal distances. The cross-section is almost circular.

Seeds, large, almost globular, dark brown, with very slightly wrinkled skins.

Observations. See the introduction to the group.

$\dagger\dagger$ *I. MISSOURIENSIS*¹

Nuttall in Journ. Acad. Philad. VII. i. p. 58 (1834).

[Nuttall's type (BM) is from "the sources of the Missouri."]

*Bot. Mag. t. 6579 (1881).

SYNONYMS.

I. tolmeiana, Herbert in Hooker and Arn. Bot. Voy. Beech. p. 396 (1841).

[Herbert's type still exists (BM).]

I. longipetala montana, Baker, Hdk. Irid. p. 10 (1892).

*Lynch, Book of Iris, p. 74 (1904).

DISTRIBUTION. The Great Basin between the Rocky Mountains, the Cascade Mountains and the Sierra Nevada. It is noticeable that where *I. missouriensis* and *I. montana* are found in close proximity, e.g. near Flagstaff and San Francisco Mountain, it is always in a neighbourhood where geological formations run one into the other and usually on a watershed which separates the two species.

¹ I am indebted for seeds of this Iris to Mr Carl Purdy of Ukiah, Cal.



- Washington* Spokane Co., 1884, Suksdorf (K).
 Kittitas Co., Ellensburg, 1897, Whited (W).
 Whitman Co., Pulman, 1897, Elmer (B).
 Falcon Valley, 1881, Suksdorf (BM).
- Montana* Bridger Mts, 1897, Rydberg and Bessey (K) (B) (E).
 Forks of the Madison River, 1897, Rydberg and Bessey (K) (B) (E).
- Idaho* Big Potlatch River, 1892, Sandberg (BM) (K) (B) (E).
- Oregon* Little Indian Creek, 1897, Sheldon (no. 8931) (W).
 Klamath Co., Johnson Prairie, 1898, Applegate (no. 2445) (W).
 Klamath Indian Reservation, 1902, Walpole (no. 2213) (W).
- Nevada* Austin, 1882, Jones (BM) (B).
 Washoe Co., 1902, Baker (B) (V).
 Pine Forest Mts, 1901, Griffiths and Morris (W).
- California* Mono Co., White Mts, Black Cañon, 1891, Coville and Funston (B).
 Bishop, Owen River Valley, 1897, Jones (BM).
 Inyo Co., 1906, Heller (E).
 Inyo Mts, 1891, Coville and Funston (K).
 Modoc Co., Goose Lake Valley, 1894, Austin (BM).
 Bear Valley, San Bernardino Mts, 1905, Davidson (W).
 [N.B. On the Laguna Mts¹, San Diego Co., there appears to grow a special form of this *Iris* in which the stems are scarcely taller than the leaves. The number of flowers in the spathe and the long pedicels in the fruiting specimens seem to prove that we must name them *I. missouriensis* and not *I. montana*, though at first sight they appear to resemble the latter closely.]
 San Diego Co., Laguna Mts¹, 1889, Orcutt (W).
 1894, Schoenefeldt (W).
- Utah* Coyote, 1894, Jones (BM).
 Glenwood, 1875, Ward (W).
- Arizona* Southern Apache Co., 1904, Hough (W).
 Willow Spring, 1890, Palmer (K).
 Johnson's Ranch, 1884, Lemmon (BM).
 West side of San Francisco Mt, 1901, Ward (K).
 Barfoot Park, Chiricahui Mts, 1906, Blumer (K) (B) (E).
 Flagstaff, 1898, MacDougal (E).
- Colorado* Mancos, 1898, Baker, Earle and Tracy (K) (BM) (E) (V).
- New Mexico* Sawyer's Peak, Grant Co., 1904, Metcalfe (BM) (E) (B).
- Mexico* Lerios, E. of Saltillo, 10,000 ft, 1880, Palmer (K) (B).

Diagnosis.

I. missouriensis *I. longipetalae* proxima sed *caulis* folia longe superat; ante hiemem initam pereunt folia, vere solum recrescunt nova.

This *Iris*, which sometimes occurs in gardens under the name of *I. longipetala montana* (see Lynch l.c.), scarcely needs a separate description. It differs only in being more slender in all its parts, in holding its flowers well above the leaves, and in losing its leaves entirely in late autumn. Its colour, the shape of its capsule, and the seeds are identical with those of *I. longipetala*. In both cases the perianth tube is short, of a pale yellow-green, and not perceptibly constricted above the ovary.

Observations. See the introduction to the group.

⁴*I. MONTANA*²

(PLATE XXII)

Nuttall MS. on specimen in the British Museum.

[Reasons for retaining the name *montana* will be found in the introduction to the *longipetala* group.]

SYNONYM.

I. pelogonus, Goodding in Coult. Bot. Gaz. XXXIII, p. 68 (1902).

[The identification is probable but not quite certain. The name was given in allusion to the statement that this *Iris* is only found growing on Wasatch Tertiary clays. This statement I have been unable either to verify or disprove owing to the inaccessibility or absence of reliable geological maps of the districts concerned.]

DISTRIBUTION. The States of Montana, Dakota, Wyoming, Colorado, Arizona, California.

- Montana* Bozeman, 1905, Blankinship (BM) (E).
- Dakota* Black Hills, 1887, Forwood (K) (W).
- Wyoming* Wind River, 1882, Forwood (B).
 Sweetwater Co., Bush Ranch, 1900, Aven Nelson (K) (B).
 [N.B. This is the type of *I. pelogonus* (v. supra).]
 Laramie, 1909, Aven Nelson (HortD).
 Albany Co., Sand Creek, 1900, Aven Nelson (B) (K).
 Centennial Valley, 1895, Nelson (E).

¹ Laguna Mts is probably a misreading of Cuyamaca Mts, which are in San Diego County. No Laguna Mts are known there and Mr S. B. Parish tells me that the plant grows in the Cuyamaca Mts.

² I am indebted for the plant from which the plate was drawn to Prof. Aven Nelson, who collected it near Laramie, Wyoming.

- Colorado.* Estes Park, 1884, Ball (K).
 Marshall Pass, 1901, Baker (K) (B) (E).
 Custer Co., 1891, Cusack (K).
 Platte Cañon, 1894, Henry (E).
Arizona. Flagstaff, 188-, Hughes (Hort Foster in MS.).
 Cave Dwellers' Gulch near Flagstaff, 1889, Munson and Hopkins (W)

Diagnosis.

I. montana imberbis; *I. missouriensis* proxima sed *caulis* foliis adultis brevior; *spathae* biflorae nec multiflorae; *segmenta* interiora oblanceolata nec obtusa nec emarginata.

Description.

Rootstock, a short-creeping rhizome, clothed in stiff dark brown sheathes.

Leaves, firm, narrowly ensiform, about 12—18 in. by $\frac{1}{3}$ in., of a glaucous green.

Stem, 18—20 in., naked.

Spathae valves, 2—4 in., scarious in upper part, narrow, sharply keeled, usually 2-flowered; although a third flower is rarely produced.

Pedicel, 1— $1\frac{1}{2}$ in.

Ovary, $\frac{1}{2}$ in., sharply trigonal, with concave sides.

Tube, $\frac{3}{8}$ in. long, purple, first constricted above the ovary and then expanding.

Falls, narrowly obovate cuneate, with low rounded median ridge; on either side of this the ground colour is yellow, especially beneath the ends of the styles. The blade is covered with diffuse lavender veins, on a faint lavender ground. The shade of lavender may be light or dark.

Standards, oblanceolate unguiculate, slightly shorter than the falls, lavender, not blunt nor emarginate as in *I. longipetala* and *I. montana*.

Styles, small, narrow.

Crests, narrow, subquadrate, coarsely toothed.

Stigma, entire, oblong.

Filaments, shorter than anthers, pale violet.

Anthers, purple.

Pollen, cream.

Capsule, rounded trigonal, tapering gradually to either end.

Seeds, pyriform, with smooth brown coats.

Observations. See the introduction to the *longipetala* group.

XIV. The Tripetalous group.

It is, of course, an exaggeration to say that the two species that form this group have only three perianth segments. The three inner segments are also present, but in a greatly reduced form. Indeed, it is not always easy to detect the small bristle-like projections to which the standards are reduced. This phenomenon is only known to occur in one other *Iris*, and that is *I. Danfordiae*, a bulbous species.

The species may be distinguished as follows:—

- | | |
|--|------------------------------|
| Leaves ensiform; spathes sometimes partly scarious in the upper part, flimsy; capsule trigonal; seeds oval, rounded with a conspicuous raphe running down one side, see Plate XLVIII, Fig. 15. | <i>I. setosa</i> (p. 92). |
| Leaves linear; spathes wholly green at flowering time; rigid, capsule rounded; seeds compressed, disc-shaped. | <i>I. tripetala</i> (p. 94). |

†‡ *I. SETOSA*

Pallas ex Link, Jahrb. i. iii. p. 71 (1820).

Ledebour, Fl. Ross. iv. p. 96 (1853).

•Regel, Gartenflora, t. 322 (1861).

•Trans. Russ. Hort. Soc. 1861, p. 196, t. 48.

Baker in J. L. S. xvi. p. 140 (1877).

Hdk. Irid. p. 11 (1892).

•Somoku Zusetsu, Vol. II. p. 8 (Jap. Hi-ogi-ayame, fide Dr Takeda).

SYNONYMS.

•*I. brachycuspis*, Fischer ex Sims, Bot. Mag. t. 2326 (1822).

Xiphion brachycuspis, Alef. BZ. xxi. p. 297 (1863).

Xyridion setosum, Klatt, BZ. xxx. p. 500 (1872).

I. brachycuspis, Fischer ex Sims, Bot. Mag. 2326 (1822).

I. Hookeri, Penny in Steud. Nomencl. ed. II. p. 822 (1840).

•*I. tripetala*, Hooker, Bot. Mag. t. 2386 (1829) non Walt (cf. S. Watson in Bot. Gaz. xii. p. 99 (1887)).

I. arctica, •Eastwood in Coult. Bot. Gaz. xxxiii. p. 132, Fig. 2 (1902) [Specimen (K)].

I. yedoensis, Franch. et Savat. Enum. Pl. Jap. II. p. 522 (Yedo 1871, Savatier no. 1223 (P)).



DISTRIBUTION. Northern Asia, Japan, Kamchatka, Alaska, Labrador and the East Coast of N. America down as far as Maine.

- Northern Asia.* Ochotsk, 1853-6, Wright (K).
Siberia, 18—, Fischer, sub nom. *brachycuspis* (C).
Amur, 1859, Maximowicz (K) (BM).
Srednekolymsk, 18—, Augustinowicz (K).
Lower Lena, 1875, Czekanowski (K).
Japan. Nippon, 1905, Faurie (B).
Yezo, 1905, Faurie (B).
Mombetsu, 1887, Faurie (P) (K).
Hakodate, 1855-6, Wright (K).
Abashiri, 1896, Faurie (P) (K).
Konoma (Hakodate), 1861, Maximowicz (K) (BM).
Shimushi Isl. 1877, Milne (BM).
Rebunshiri Isl. 1892, Faurie, no. 8485 (K).
Sakhalin. 1873, Schmidt (K).
1908, Faurie (L).
Kamchatka. 1900, Littledale (K).
Petropavlosk, 1900, Shockley (BM).
Behring Isl. 1891, Macoun (K).
Alaska. Nome, 1909, Powers, no. 54 (K).
[N.B. This is the type of Miss Eastwood's *I. arctica*.]
Labrador. Cape Wolstenholme, 1872, Waitz (V).
Okkak, 18—, Waitz (V).
No locality, 1815, Goetz (V).
No locality, Parreyss (V).
East Coast. Maine; Cutler, 1902, Fernald (V).
Island near Eastport, 1909, Fernald (HortD).

Diagnosis.

I. setosa Apogon; *folia* ensiformia; *caulis* plerumque ramosus; *segmenta* interiora minuta, setosa; *capsula* inflata; *semina* nitida, sutura laterali conspicua.

Description.

Rootstock, a thick rhizome covered with the fibrous remains of old leaves.

Leaves, ensiform, green, slightly glaucous and usually tinged with purple at the base, 1—2 ft. long and $\frac{1}{2}$ —1 in. broad.

Stem, stout, solid, deeply forked, bearing several heads of flowers, of which those on the first lateral branch rise as high as those on the main stem. A reduced leaf is attached at each bifurcation.

Spathe valves, narrow, acuminate, unequal, $1\frac{1}{2}$ —2 in. long, the outer valve being the shorter, green or flushed with purple or slightly scarious, 2—3-flowered.

Pedicel, 1— $1\frac{1}{2}$ in. long.

Ovary, acutely trigonal, green or flushed with purple.

Tube, $\frac{1}{4}$ — $\frac{3}{4}$ in., shorter than the ovary, and scarcely separated from it by any constriction.

Falls. The orbicular or more usually heart-shaped blade narrows abruptly to the short wedge-shaped haft. The latter is veined with purple on a yellowish white ground. The white ground, veined with purple, is visible for a short distance on the blade, which then becomes a uniform purple with inconspicuous darker veins. The exact shade of purple is very variable; it is usually a blue purple but has sometimes a distinctly red tinge.

Standards. Variable in shape but not more than $\frac{1}{2}$ — $\frac{3}{4}$ inch long. The most usual form is broad at the base, narrowing abruptly to a long fine point. Less frequently the width increases a second time before narrowing to a short point (see Fig. 12).

Styles, short, oblong, about 1 in. long, whitish with purple keel.

Crests, overlapping, subquadrate, with coarsely serrate edges.

Stigma, a rounded, triangular tongue.

Filaments, purple or yellow stained with purple.

Anthers, purple.

Pollen, cream.

Capsule, much inflated, trigonal with grooved sides, scarcely twice as long as broad. The seeds soon become detached and rattle in the capsules.

Seeds, light brown, glossy, with conspicuous raphe down one side (see Plate XLVIII, Fig. 15).

Observations.

It is not at present possible to separate and define the various forms of this Iris that are already known to us. It was first found by Pallas in Siberia and extends to the extreme north-eastern corner of Asia. From there it passes into Alaska and finally reappears again on the east coast of Canada and Maine. Under the names of *setosa*, *setosa canadensis*, *Hookeri* and *tridentata*, I have found growing in gardens at least six forms of this Iris. What is more curious is that each form when self-fertilised



FIG. 12 Full- and side- views of the two forms of inner segments (standards) of *I. setosa*.

comes practically true from seed. The variations are in stature, in the green or purple base to the leaves, in the green or purple flushed spathes and ovary, in the foliage and in the shape of the segments. The various forms, when grown side by side, are obviously distinct and yet equally obviously unworthy each of a specific name. The features that are common to all are the minute, bristle-like standards from which the species obtained its name, the large heart-shaped falls, the curious way in which the topmost lateral branch rises as high as the main stem, the inflated capsules with thin membranous walls and the characteristic seeds (see Plate XLVIII, Fig. 15), which are totally unlike those of any other species.

Until seeds have been obtained from the various localities and plants raised and grown under identical conditions, it seems unwise to attempt to separate the various forms, for the differences that are apparent in the living plants are usually quite invisible in the ordinary herbarium specimens. I have at last succeeded in obtaining seeds both from the east coast of America and from Eastern Asia but the plants raised from them show no difference except in colour and size. The Asiatic examples are of a reddish purple and the stems 18—24 in. high, while those from the coast of Maine have a 10—12 in. stem and blue-purple flowers.

I. setosa varies in height from about a foot to slightly over two feet. By some curious confusion, there is now in cultivation a dwarf form under the name of *I. Douglasiana pygmaea*. It is very floriferous and a desirable garden plant. It is possible, and indeed probable, that this may be the Labrador or Alaskan form¹, for all the Labrador specimens that I have seen were of this size and appearance and so too apparently were the Alaskan plants described by Miss Eastwood as *I. arctica*. On the other hand, the tallest form that I possess was sent to me from Russia and said to be from Kamchatka.

I am afraid, however, that especially in the case of this Iris, I am very unwilling to accept as authentic any supposed local form that does not come to me direct from the locality in question. The reason is that *I. setosa* with its pointed tongue-like stigma is certainly self-fertile. Every flower produces a capsule of seed, which when ripe is very easily scattered broadcast. The seeds germinate as readily and may thus oust the original occupants of the spot on which they fall. Probably some such cause as this accounts for the name of *I. Douglasiana pygmaea* attached to what is undoubtedly a form of *I. setosa*.

Cultivation presents no difficulty in any soil not too strongly impregnated with lime. The plants enjoy abundant moisture during the growing season but flower well, though with smaller blooms, even in poor, dry sand. The species is very easily raised from seed and the young plants can generally be relied upon to flower before they are fifteen months old. No white-flowered form appears to be in cultivation, but a specimen was found by Dr Takeda in 1909 on the Tomoshiri Promontory, near Nemuro, Yezo.

I. TRIPETALA

Walt. Fl. Carol. p. 66 (1788), non Linn. fil. Suppl. Plant. p. 97 (1781) = *Moraea tripetala*.

*Géel, Sert. Bot. vol. 1. (1830).

Baker in J. L. S. XVI. (1877) 138.

S. Watson in Bot. Gaz. XII. p. 99 (1887).

SYNONYMS.

I. tridentata, Pursh, Fl. Am. Sept. 1. p. 30 (1814).

*Sweet, Brit. Flow. Gard. vol. III. t. 274 (1828).

DISTRIBUTION. The South Eastern United States.

North Carolina, 1885, McCarthy (C) (W).

Robeson Co., between Pates and Red Banks, 1905, Harper (W).

Columbus Co., 1884, McCarthy (W).

Wilmington, 1885, McCarthy (W).

South Carolina, Nuttall (C).

Tennessee, Tullahoma, 1875, Patrius (W).

Florida, Apalachicola, in swamps amid pine barrens, 18—, Hb. Chapman, no. 4041 (V) (W) (K).

Diagnosis.

I. tripetala imberbis: *caulis* simplex vel ramosus, foliis linearibus subaequalis; *spatharum* valvae valde inaequales, herbaceae; *segmenta* interiora minuta, tridentata, denticulo medio acuminato; *semina* compressa, orbicularia.

Description (taken partly from herbarium specimens and partly from Foster's notes on a specimen which he had in cultivation).

Rootstock, a somewhat slender rhizome of wide-creeping, almost stoloniferous character.

Leaves, linear, finely ribbed, green with a red edge, 12—15 in. by $\frac{1}{4}$ — $\frac{3}{8}$ in.

Stem, about a foot in height, dark in colour, bearing several reduced leaves and a terminal 1—2-flowered head. One or two lateral branches are sometimes produced.

Spathes, narrow, pointed, quite herbaceous, rigid, unequal, the outer being usually less than half the length of the inner valve.

¹ It turns out, also, to be indistinguishable from the Maine plant.

*Pedice*l, about 1 in. long.

Ovary, trigonal, with a groove running down each angle.

Tube, funnel-shaped, less than 1 in. long.

Falls. The suborbicular blade is about as long as the narrow haft. The colour of the blade is a bluish purple, mottled with paler patches and veined with thin but conspicuous darker veins. The signal patch is white with some trace of yellow in the centre. The haft is whitish with yellow-brown reticulations. 2 in. long.

Standards, $\frac{1}{2}$ in. long, oblanceolate, erect, more or less tridentate, with the central tooth much longer and larger than the laterals. (It is possible that the standards are sometimes not toothed, this was apparently the case in Foster's specimen.)

Styles, narrow.

Crests, large, subquadrate.

Stigma, entire, semi-circular in outline.

Filaments, very short.

Anthers,

Pollen,

Capsule, $\frac{3}{4}$ —1 in. long, much rounded trigonal, the sides being hardly at all concave.

Seeds, thick, compressed dark red-brown discs, in a single row in each loculus.

Observations.

This little known Iris is apparently no longer in cultivation in Europe. It flowered once with Foster at Shelford but it needed a hothouse temperature in July to induce the flower to open. Some details of the description here given are taken from Foster's MS. notes.

In many ways this Iris resembles the American forms of *I. setosa*, which are usually known as *I. Hookeri* or *setosa canadensis*. It differs from that plant, however, in having linear leaves, conspicuously unequal green spathe valves of a thick rigid texture, a rounder, less sharply trigonal ovary and capsule and disc-shaped seeds.

In Van Géel's Sertum Botanicum 1. there is a figure of this Iris, together with the statement that it was first known in Europe as flowering in May, 1828, in the garden of David Falconer, at Carlowrie, near Edinburgh.

Nothing is known of its requirements in cultivation but it would probably require a warm position in soil that was not too dry in spring and early summer.

XV. *I. verna*.

This anomalous species is perhaps best described by saying that it has the appearance and habit of a small *I. pumila* but has not the multicellular beard, which would obtain admission for it to the Pogoniris section.

I. VERNÆ

Linn. Sp. Pl. ed. 1. p. 39 (1753).

Ait. Hort. Kew. ed. 1. vol. 1. p. 73 (1789).

Michaux, Fl. Bor. Amer. 1. p. 22 (1803).

*Sweet, Brit. Fl. Gdn. 1. t. 68 (1824).

Lodd. Cab. t. 1855 (1833).

Klatt in Linnaea xxxiv. p. 596 (1866).

A. Gray, Manual, ed. v. p. 516 (1867).

Baker in J. L. S. xvi p. 144 (1877).

Hdk. Irid. p. 16 (1892).

Britt. and Brown, Ill. Fl. N. U. S. 1. p. 452 (1896).

*Lynch, Book of Iris. p. 87 (1904).

*Bot. Mag. t. 8159 (1907).

Pluk. *Phytogr. t. 196, Fig. 6 (1691).

Almag. p. 198 (1696).

SYNONYM.

I. nana, Pers. Syn. Plant. p. 53 (1805).

DISTRIBUTION. The Eastern United States. It is said to be most frequent in the dry uplands of the maritime pinebelt.

Virginia. No locality, 17—, Clayton in Herb. Gronovius (BM).

Richmond, 1832, Macnab (BM).

Massanutten Mt, 1893, Heller (E).

Kentucky. Bath Co., Short (K).

No locality, 1833, Griswold (E) (B).

Tennessee. Warmispring Mts, 1842, Rugel (BM).

North Carolina. Wilmington, Hb. Hooker (K).

Biltmore, 1896 (K).

Georgia. N. slope of Pine Mts, Meriwether Co., 1901, Harper (BM) (B).

Alabama. No locality, Buckley (BM).

Diagnosis.

I. verna Apogon; sed habitus Pogoniridis; *folia* ensiformia; *caulis* obsoletus; *tubus* ovarium multoties superans. *Segmenta* omnia subaequalia.

Description.

Rootstock, a slender rhizome, not unlike that of *I. pumila*.

Leaves, ensiform, of a glaucous green, tinged with pink at the base; about 4—6 in. long at flowering time and afterwards increasing.

Stem, very short.

Spathes, green, acuminate, divergent, exposing the tube, $1\frac{1}{2}$ —2 in. long.

Pedicel, none.

Ovary, trigonal.

Tube, rounded, trigonal, $1\frac{1}{2}$ in. long.

Falls. Obovate-cuneate, $1\frac{1}{2}$ in. by $\frac{1}{2}$ in. The haft bears a broad pubescent band of orange, dotted with brown near the base and edged with white slightly veined with brown-lilac. The orange band extends on to the blade, which is of a uniform blue lilac.

Standards. The obovate blade narrows gradually into the long linear haft. Both blade and haft are of the same uniform blue-lilac colour as the blade of the falls.

Styles, keeled, of a paler lilac colour, not separating for about $\frac{1}{4}$ in. above the base of the segments.

Crests, large, triangular.

Stigma, entire.

Filaments, colourless or pale mauve, longer than the anthers.

Anthers, pale blue.

Pollen, cream.

Capsule, about $\frac{3}{4}$ in. long, trigonal with a groove on each face, blunt at the base and tapering to a point above.

Seeds, pyriform, light yellowish brown with a distinct white raphe.

Observations.

I. verna seems to stand entirely apart from all other Irises. It is sometimes confused in dealing with herbarium material with *I. cristata*. It differs, however, in its foliage and in the shape of the segments. Moreover it has erect standards, while those of *I. cristata* spread almost horizontally.

For some reason, it is not an easy Iris to cultivate. In my experience it dislikes a very hot dry soil and does better where the soil is not allowed to become absolutely dry in summer. In half shade in peaty soil, an old plant of *I. verna* flowered so profusely in 1910 that it formed few new growths and seemed to have exhausted its strength. It is probable that we do not yet know the conditions under which it thrives.

It seems impossible to group *I. verna* with any other species in the genus, for when not in flower it would be taken for a Pogoniris and yet it has no trace of a beard but merely a golden pubescence of unicellular hairs. It is difficult to see why it was ever classed with *I. dichotoma* in the Pardanthopsis section.

THE PARDANTHOPSIS SECTION

There is apparently only one known species of Iris that belongs to this section, which was so named by reason of the resemblance of *I. dichotoma* to *Pardanthus* (*Belamcanda*) *Chincensis*. See Hance in Journ. Bot. XIII. (New Ser. IV.), p. 105 (1875).

†† *I. DICHOTOMA*

*Pallas, Iter. III. p. 712, tab. A, fig. 2 (1773).

Linn. fil. Suppl. p. 97 (1781).

Willd. Spec. Plant. I. p. 230 (1797).

Vahl, Enum. vol. II. p. 236 (1806).

*Ker in Bot. Reg. t. 246 (1817).

Roem. and Schult., Syst. Veget. I. p. 464 (1817), Suppl. p. 306 (1822).

Link, Enum. alt. I. p. 58, no. 498 (1821).

Bunge, Enum. Pl. Chin. Bor. p. 63 (1831).

*Sweet, Brit. Fl. Gard. t. 96 (1838).

Reichenb. Icones et Descr. Plant. I. 31 (1822).

Hance in Journ. Bot. XIII (New Ser. IV.), p. 105 (1875).

Baker in J. L. S. XVI. p. 142 (1877).

Hdk. Irid. p. 17 (1892).

- * Bot. Mag. t. 6428 (1879).
 Maxim. Mél. Biol. x. p. 738 (1877).
 in Bull. Acad. Pét. xxvi. p. 540 (1880).
 Franch. Pl. David. p. 298 (1884).

SYNONYMS.

- I. pomeridiana*, Fischer ex Ledeb. Fl. Ross, iv. p. 106 (1853).
 Klatt in Linnaea, xxxiv. p. 612 (1866).
Pardanthus dichotomus, Ledeb. Fl. Ross, iv. p. 106 (1853).
Evansia dichotoma and *vespertina*, Decaisne in Bull. Soc. Bot. de Fr. xx. 300 (1873).

DISTRIBUTION. From Irkutsk and Transbaikalia through Manchuria into Northern China as far south as Shensi, Shantung and Kiangsu.

- Irkutsk, 18—, Besser (V) (K).
 Dahuria near the Rivers Ingoda and Argun, 177—, Pallas (LS) (BM) (K) (C) (V).
 in mountain meadows, 1830, Turczaninow (K).
 1831, Steven (V).
 1836, Fischer (P).
 1890, Karo (E).
 near River Argun, 1830? Turczaninow (V).
 Nertschinsk, 1889, Karo (K) (B).
 Mongolia, South, 1871, Przewalski (K).
 Ordos, 1884, Potanin (E) (B).
 East (Gehol), 18—, David (no. 2165) (P).
 Mukden (Peiling), 1887, Webster (K).
 1897, Komarov (K).
 China. Chi-li, Pekin, 1865, Williams (K) (BM).
 1868-71, Bushell (K).
 1881, Bretschneider (BM) (K) (B).
 1885, Carls (E).
 1888, Bodinier (L).
 Shensi, North, 1901, Giraldis (nos. 6697, 6698) (B).
 Shantung; Chefu, 1880, Forbes (BM).
 1869, Williamson (E).
 Kiangsu; Peitaho, 1910, Bayley Balfour (E).

Diagnosis.

I. dichotoma Pardanthopsis; *folia* alternate equitantia; *caulis* valde ramosus, ramis saepe binis ex eodem loco productis; *spathae* multiflorae, floribus peracta fecundatione spiraliter contortis; *semina* utrinque in alam expansa.

Description.

Rootstock, a slender rhizome.

Leaves, blue green with a distinct white edge, about 6—8 in number arranged in a fan-shaped cluster, clasping the base of the stem; 8—12 in. \times 1½ in. at the middle, the lowest leaves being somewhat falcate.

Stem, rather more than 2 ft. in height, much branched, the peduncles often issuing in pairs of equal length at the same point, with a short bract at each fork.

Spathes, not exceeding ½ in., wholly scarious, 3—5 flowered.

Pedicel, up to 1 in. or 1½ in. long, nearly semicircular in section, articulated at the base of the ovary.

Ovary, bright green, cylindrical, apt to drop at the slightest touch, when the flower fades unless fertilisation has taken place.

Tube, extremely short, about ¼ in.

Falls. The broadly cuneate haft is not separated by any constriction from the almost square blade, which is held horizontally, while the haft rises at an angle of about 60°, as do also the standards. The segments thus form a kind of funnel round the style branches. The haft is barred with stripes of yellowish brown along the edges and flecked with purple on a white ground along the centre. The blade is white, with a few brown-purple spots.

Standards. The blade is of a rounded oblong and the haft is channelled, the whole segment being much shorter than the falls. The colour of the blade is a grey white faintly striped with purple, and the haft is much dotted with brown purple.

Styles, almost oval in outline, the central ridge being speckled with brown purple and the wings colourless and semi-transparent. The styles are connate for a short distance above the base of the segments.

Crests, linear, very narrow but relatively long.

Stigma, with two prominent teeth.

Filaments, yellowish white, minutely spotted with purple.

Anthers, colourless along the centre but with dark brown edges.

Pollen, deep yellow.

Capsule, oblong, 1—1½ in. long, trigonal with deeply channelled sides.

Seeds, small, dark brown, with curious, pale wings at either end (see Plate XLVIII, Fig. 11).

Observations.

This curious Iris was first discovered by Pallas and since that time it has been introduced and reintroduced into cultivation at intervals. It has often been confused with *Pardanthus* (*Belamcanda*) *chinensis* and the growth of the two plants is certainly very similar. The flowers, however, are very different, for the segments of those of the *Pardanthus* are all approximately equal while the standards of *I. dichotoma* are noticeably smaller than the falls. The seeds too are very different, those of the *Pardanthus* being relatively large and spherical, with glossy black iridescent coats, and thus easily distinguished from those of *I. dichotoma* (see Plate XLVIII, Fig. 11).

This Iris probably produces more flowers on each stem than any other Iris. The stem is much branched and even the branches often issue in pairs at the same point. Moreover from each spathe as many as five or even more flowers are produced in succession. Each flower, unfortunately, lasts only a few hours and often only opens in the afternoon—a character which gained for the plant the synonym of *I. vespertina*. However, such is the profusion of flowers that there are usually four or six to be found open at once on each plant.

Another peculiarity of this Iris lies in the fact that it does not begin to bloom until about the middle of August and then continues in flower for about three weeks or a month. Each flower as it dies twists up in a curious spiral and often falls off together with the ovary between which and the pedicel there is an articulation. In all the other known Irises, if the withered flower falls very easily, it always snaps off above the ovary, except perhaps in the case of *I. japonica*.

Iris dichotoma appears to be variable in colour (cf. Franchet, Pl. David. 1. p. 298), although at present only a dull greenish white form mottled with brown purple, seems to be in cultivation. The Botanical Magazine figure represents a purple flowered form, and Foster had in flower in August 1905 a similar plant that he raised from seeds sent from Mukden, which he described as having falls of a reddish lurid purple with a dead white signal patch and standards of a somewhat faint red purple.

It is not a difficult Iris to cultivate especially if it is raised from seed. The young growths suffer occasionally from late frosts in spring but in a warm sheltered corner it does well and seedling plants will flower in little more than a year from the time of germination. Seed is unfortunately not very readily obtained in England even with artificial pollination. In Southern Europe, however, seed is set readily.

I. dichotoma does not appear to be exacting as to soil but the individual plant is probably short-lived, and so much of its energy seems to go into the flowering stem that no lateral shoots are formed, with the result that the whole plant not infrequently dies after flowering.

With all its defects, however, *I. dichotoma* is not to be despised, for it provides us with Iris flowers at a season when few other species can be depended upon to bloom.

THE EVANSIA SECTION

This section comprises the comparatively small number of rhizomatous Irises in which the central line along the haft and part of the blade of the falls is developed into a raised linear crest.

The first member of this section to be described, namely *I. japonica*, was so distinct from all the known Irises that Salisbury (Trans. Hort. Soc. 1. p. 303, 1812) made a new genus with the name of *Evansia* for it, after one Thomas Evans of the India House and Stepney "who had introduced, besides it, so many other plants into this country."

With the exception of the crest on the blade of the falls which is the distinguishing mark of the section there is probably no other character in which all the plants here grouped together agree. Indeed, it almost seems that it is not really a natural group, so great is the divergence found among its members. *I. tectorum* is obviously nearly related to *I. Milesii* both in its foliage and in its capsule and seeds but it is difficult to see much relationship among the others.

An interesting question arises when we attempt to discover the origin of the crest. Is a beard a development from a crest or have both bearded and crested Irises been evolved along parallel lines from a beardless Iris? No definite answer to these questions has yet been given but the attempt to find some reply has produced some interesting results. On Plate XXIV there is a drawing of an Iris, which was produced by fertilising the Loppio variety of *I. Cengialti* with pollen of *I. tectorum*. Many previous attempts to cross *I. tectorum* had apparently been made but without success and this particular cross has been, with me, the only one that has produced sound seeds.

A reference to the plate will show that the hybrid has lost the erect standards of the seed parent, Loppio, and assumed the flattened outline of the pollen parent, *I. tectorum*. The colour is a compromise

for it is not quite so uniform as that of Loppio and yet the darker mottlings are not nearly so conspicuous as those on the falls of *I. tectorum*. The foliage is not identical with that of either of the parents and the same is true of the ovary, tube and spathes.

A still more obvious compromise between the characters of the two parents is to be found on the blade of the falls, where the crest splits up into fine hairs to form a scanty beard. (Cf. the enlarged drawing of a part on Plate XXIV.)

More recently Herr F. Scheubel of Oberlahnstein has obtained similar results by crossing some early dwarf Pogoniris, probably some variety of *I. chamaeiris*, with pollen of *I. tectorum*. I have not yet seen living flowers of this cross, but from the dried fragments that were sent to me and from the description, it was easy to see that a similar compromise between the characters of the two parent species had resulted.

Unfortunately, these hybrids, as well as others which have resulted from crossing widely separated species, have so far proved to be completely sterile. In consequence, they have not thrown much light on the questions of the origin of the beards and crests in Irises as we know them to-day, and of their relationship to the beardless species.

The species comprised in the section may be differentiated as follows:

- | | | |
|----|--|---------------------------------|
| 1. | { Stem not produced or extremely short. | <i>I. cristata</i> (p. 106). |
| | { Stem produced. | 1. |
| | { Stem unbranched. | <i>I. speculatrix</i> (p. 105). |
| | { Stem branched. | 2. |
| 2. | { Spathe consisting of a single valve. | <i>I. gracilipes</i> (p. 104). |
| | { Spathe consisting of two valves. | 3. |
| 3. | { Leaves thick, smooth, with glossy upper- and glaucous under-surface. | <i>I. japonica</i> (p. 99). |
| | { Leaves thin, distinctly ribbed, both surfaces slightly glaucous. | 4. |
| 4. | { Rhizome green, stem tall, much branched, flowers small. | <i>I. Milesii</i> (p. 101). |
| | { Rhizome buff, stem shorter, less branched, flowers large. | <i>I. tectorum</i> (p. 102). |

† *I. JAPONICA*

- Thunberg, Trans. Linn. Soc. II. p. 327 (1794).
 Miq. in Ann. Mus. Bot. Lugd.-Bat. III. p. 141 (1867).
 Baker in J. L. S. XVI. p. 143 (1877).
 Hdk. Irid. p. 24 (1892).
 Franch. et Savat. Enum. Pl. Jap. II. p. 41 (1879).
 Maxim. in Bull. Acad. Pétersb. XXVI. p. 538 (1880).
 Mél. Biol. X. p. 736 (1880).
 Franch. Pl. David I. p. 298 (1884).
 II. p. 127 (1888).
 *Somoku Zusetsu, II. no. 9 (japonice Shaga, fide Dr Takeda).
 *Phonzo Zoufou, XXIII. p. 11.

SYNONYMS.

- I. squalens*, Thunb. Flor. Jap. p. 33 (1784), non L.
I. chinensis, *Curt. Bot. Mag. t. 373 (1797).
 *Regel, Gartenflora, t. 511 (1866).
I. fimbriata, *Vent. Jard. Cels. t. 9 (1800).
 *Redouté, Lil. III. t. 152 (1807).
 *Savi, Fl. ital. II. p. 87 (1822).
 *Drapiez, Herb. Amat. Fl. I. t. 30 (1828).
Isis fimbriata, Tratt. Archiv Gewachsk. t. 668 (181-).
 Ausw. Gartenpfl. t. 111 (1821).
Evansia chinensis, Salisb. in Trans. Hort. Soc. I. p. 303 (1812) (see also p. 98).
Evansia fimbriata, Decaisne in Bull. Soc. Bot. France, XX. p. 302 (1873).

DISTRIBUTION. Woods and moist places in Central China and Japan

- China*. 1846, Fortune, no. 41 (K) (BM).
Hupei. 1885-88, Henry, no. 786 (BM) (B).
 Ichang and Patung, 1886, Henry, nos. 1161, 1254 (K).
 Nan-t'o, 1887, Henry, no. 1967 (K).
Shensi (South). Ko-lu-pa, 1901, Giraldu (no. 6689) (B) (in confusion with *I. tectorum*).
Kweichow. Hin-y-hien, 1897, Bodinier (L).
 Kwei-yang, 1898, Bodinier (L).
Yunnan. No locality, 18—, Delavaye (P).
 18—, Ducloux, no. 26 (K).
 East flank of Tali Range, 1906, Forrest, no. 1898 (K).
 Mengtze; Red River, 1896, Hancock, no. 464 (K).
 Mengtze, 18—, Henry, nos. 11821, 11821 A, 10599 (K).

- Japan. Central Mountains, 1879, Maries (BM).
 Nagasaki, 1861, Schattmuller (B), Maingay (K).
 1862, Oldham (K).
 1863, Maximowicz (K) (BM).
 1879, Bissett (BM).
 Daisen, 1899, Faurie (B).
 Hakone, 1875, Challenger Exped. (K).

Diagnosis.

I. japonica Evansia; *rhizoma* stoloniferum; *caulis* ramosus folia superat; *folia* laevigata, saturate viridia; *segmenta* exteriora cristata.

Description.

Rootstock, a somewhat slender greenish-coated rhizome, widely creeping by means of stolons or underground shoots, often 6 in. or more in length.

Leaves, ensiform, dark green with a polished upper- and glaucous under-surface, three or four to each fanlike tuft, narrowing gradually to a point 18—24 in. long by 1—2 in. broad.

Stem, about 18 in. long, bearing many heads of flowers in a regular raceme.

Spathes, 3—5 flowered, valves pale green, $\frac{1}{2}$ — $\frac{3}{4}$ in. long.

Pedicel, about 1 in. long, triangular in section.

Ovary, $\frac{1}{4}$ in., rounded trigonal, with a shallow groove on each surface, bright green.

Tube, $\frac{1}{2}$ — $\frac{3}{4}$ in. long, slightly funnel-shaped, white.

Falls. Obovate cuneate with a serrated wavy edge. The groundwork of the centre of the haft and of the blade is white, bordered with deep mauve blotches, which fade into the pale lilac mauve colour of the circumference. From the base of the haft there start three parallel ridges. The centre ridge is at first white with an orange tip becoming entirely orange on the blade, where it is covered with fine silky white hairs. The two flanking ridges are white blotched with yellow brown and fade away on the blade, where the central crest becomes conspicuous. $1\frac{1}{2}$ in. long by $\frac{3}{4}$ in. broad.

Standards, nearly horizontal, oblong unguiculate, with a serrated, and widely emarginate, upper edge, $1\frac{1}{4}$ in. long by $\frac{1}{2}$ in. wide, pale lilac mauve.

Styles, $\frac{1}{2}$ in. long by $\frac{1}{4}$ in. broad, of a slightly deeper shade of mauve than the rest of the flower.

Crests, large, very deeply fimbriated.

Stigma, with slightly crenate edge, entire.

Filaments, white, longer than the anthers.

Anthers, white, not much more than $\frac{1}{4}$ in. long.

Pollen, white, and always so imperfect that I have not been able to determine its shape.

Capsule, small, elliptical, $\frac{3}{4}$ — $\frac{7}{8}$ in. long.

Seeds, pyriform, with slight arillus as in *I. tectorum*.

Observations.

When well grown, *I. japonica* is a very decorative plant. The broad dark-green foliage is ever-green with a little protection from severe frost. Unfortunately, owing to its early flowering habit¹, it is rarely able to produce its blooms out of doors in England. The rhizomes themselves are quite hardy and have even been naturalised in Chitral, where very low temperatures are recorded in winter. I am indebted for plants from this source to the kindness of Major-General Lorne Campbell of Abbottabad, and I had hoped that this undoubtedly hardy strain would perhaps consent to flower in England but unfortunately this has not proved to be the case. Indeed, the plants are at their worst in spring and early summer, when our sun is not hot enough to cause vigorous new growths and flowers to develop. It is true that the hot summer of 1911 ripened the growths so well that the plants were prepared to flower early in 1912, but the hard frost at the end of January destroyed all the flower shoots while they were quite immature.

In spite of the fact that the individual flowers are very shortlived, the number that are produced on each flowering stem make this Iris a valuable cool greenhouse plant, where it does well, either planted out in a border or in pots. Plants cultivated under glass can be given that rest and ripening which is necessary if the plant is to flower.

Forms with variegated leaves are known but it is a question of taste whether such monstrosities are really desirable. It is also possible that a pink-flowered form exists in China, if we may trust the colour of a drawing made in that country before 1844 by a Mrs Julia Allport (K).

For some reason, this Iris seems very reluctant to set seed. Maximowicz (l. c.) states that he nowhere found capsules or seeds in Japan, and artificial pollination seems useless in England. Sir Michael Foster tried in vain to obtain seeds and my own efforts to fertilise flowers have met with no better success. Dr D. D. Cunningham of Torquay, and his neighbour, Mr Eden Phillpotts, very kindly undertook experiments in their milder climate, but their combined efforts only produced one puny capsule

¹ It is possible that this Iris can be made to flower under glass at nearly any period of the year by withholding moisture and resting the rhizomes for some weeks or months, when the foliage has developed fully. When moisture is once more given, growth soon becomes active and flower-stems should rapidly appear.

with a few seeds of doubtful fertility. If seed could only be obtained, it is possible that plants might be raised, which would become better adapted to English climatic conditions and give us a valuable garden Iris. Probably, in this case, the greatest chance of success would be to grow the plants in a sunny, sheltered nook in stony, well-drained soil in a rock garden. Even the ordinary form of this Iris is occasionally able to produce its flowers in the open. Instances of this in Jersey and Devonshire occurred in 1912.

Cultivation is not difficult and it is possible that the plants would do well in a half shady position among shrubs. The soil should be well drained and not too rich, though care must be taken that the plants are not starved when they have been growing for several years in one position or in a pot.

††*I. MILESII*

Foster in Gard. Chron. XX. p. 231 (1883) [Type in Hb. (K)].

•Baker in Bot. Mag. t. 6889 (1886).

Hdk. Irid. p. 23 (1892).

in Hooker, Fl. Brit. Irid. VI. p. 273 (1894).

SYNONYM.

I. Wattii, Baker, Hdk. Irid. p. 17 (1892) [Type in Hb. (K)].

DISTRIBUTION. This Iris is only known from widely separated districts.

Kulu: Parbati, 1876, Brandis (K).

Spiti: north foot of Tari Pass via Mud to south foot of Parang Pass, 1856, Schlagintweit, no. 6964 (B).

Bashahr: Seralin to Taranda, 1890, Hb. Lace (E).

North-West India, 18—, Wallich (BM).

Manipur, 1889, Hort Foster (MS).

Summit of Khongui Hill, 1882, Watt, no. 6337 (K). [This is the type of Baker's *I. Wattii*.]

[Foster (MS.) described four seedlings given him by Colonel Beddome, raised from seeds gathered "in Assam on the hills near Manipur," as being *I. Milesii*. They flowered in his garden in 1891.]

Yunnan: Mengtze 6000 ft., 18—, Henry, no. 9117 (K).

[This specimen appears to be a dwarf form of the species with leaves a little less, and stem a little more, than a foot long. These dimensions were also those of some plants that flowered in my garden in the exceptionally dry spring of 1912. In ordinary seasons the dimensions would be doubled.]

Diagnosis.

I. Milesii Evansia; *rhizoma* viride; *caulis* ramosus folia late ensiformia, luteo-viridia, nervis prominulis percurta superat; *spathae* subscariosae, multiflorae; *segmenta* omnia obtusa, emarginata, patentia, obscure maculata.

Description.

Rootstock, a thick fleshy rhizome, of a pale-green colour on the upper surface, with distinct rings where old leaves have become detached.

Leaves, of a pale, yellowish-green, 2 feet or slightly more in length, 2—3 in. wide, thin, ribbed.

Stem, 1—3 ft.; rises from a distichous tuft of many reduced leaves, much branched, with a pointed, bractlike leaf at each fork.

Spathes, 2—3 or more flowered; valves keeled, pointed, green, scarious at the margin.

*Pedice*l, about 1—1½ in. long, semicircular in section.

Ovary, dark green, triangular, with no obvious constriction at the base of the tube.

Tube, about ½ in., pale green.

Falls. Blade about 1¼ in. long, haft 1 in. Blade oblong with a curiously blunted, emarginate end, pale reddish purple, with darker veins and blotches. Haft white marked with deep purple veins. Crest orange with purple spots along the base, very much cut up so as to become almost a beard.

Standards, 1¾ in. by ¾ in., oblong, spreading, with canaliculate haft; apex emarginate with a distinct tooth in the centre of the notch.

Styles, about 1 in. long.

Crests, quadrate with a fimbriated edge.

Stigma, obscurely bilobed.

Filaments, short but slightly longer than the anthers.

Anthers, short, cream.

Pollen, white, similar to that of *I. tectorum* but somewhat smaller and of a less pointed oval.

Capsule, oblong, much rounded, trigonal, somewhat inflated, with thin parchment-like walls, with slightly raised transverse veins.

Seeds, very dark almost black, pyriform, with a slight ridge running down one side and a minute white aril.

Observations.

This Iris was named by Foster after Frank Miles, who introduced it into cultivation about 1880 from seeds collected by his cousin in Kulu. Some of these seeds were sent to Max Leichtlin and it was from him that Foster obtained the plants which he eventually described in the *Gardeners' Chronicle*. A later manuscript note makes it quite clear that the Manipur plant seemed to Foster to be merely *I. Milesii* and this is supported by the type of Baker's *I. Wattii* (K), which is obviously *I. Milesii*. Baker's description of his species exactly fits the latter except for the apparent absence of crest, which is not easy to distinguish even in very carefully dried specimens.

From the decorative point of view this is distinctly a disappointing Iris. The foliage is bolder and more vigorous than that of nearly any other species and the much branched stem excites the curiosity of those who have not seen the flowers. These however are somewhat insignificant, for they are small, fugitive, and of a colour that is not altogether pleasing. It would seem to have possibilities for the hybridiser but, unfortunately, though self-fertilised flowers set abundant seed, pollen of other species seems hitherto to have had no effect. If the flowers of *I. tectorum* could be combined with the habit of *I. Milesii*, the result would be really valuable.

There is said to be a variety *superba* with much finer flowers than the type but I have never so far met with a specimen worthy of the name. Seedlings have shown very little, if any, variation.

I. Milesii is in many respects intermediate between *I. tectorum* and *I. japonica*. In the branching stem, the small fugitive flowers and the ring-like scars on the greenish rhizome, it closely resembles *I. japonica*, from which however it differs, in common with *I. tectorum*, in not being stoloniferous and in the deciduous character of the leaves. Autumn frosts that leave the foliage of *I. japonica* untouched, soon destroy that of *I. Milesii*.

Cultivation is comparatively easy and the directions apply that are given under the Observations on *I. tectorum*.

†‡ *I. TECTORUM*

(PLATE XXIV)

Maximowicz in Bull. Acad. Pétersb. xv. p. 380 (1871).

Mél. Biol. vii. p. 563 (1870).

x. p. 736 (1880).

*Regel, Gartenflora xxi. p. 65, t. 716 (1872).

*Bot. Mag. t. 6118 (1874).

Baker in Gard. Chron. 1876, ii. p. 37, fig. 11.

Hdk. Irid. p. 23 (1892).

Franch. et Savat. Enum. Pl. Jap. ii. p. 41 (1879).

Franch. Plant. David. i. p. 297 (1884).

*Flore des Serres, t. 2282 (1877).

SYNONYMS.

I. chinensis, Bunge, Enum. Pl. Chin. Bor. p. 64 (1834), non Curt. [cf. Maxim. Mél. Biol. x. 736].

[N.B. I have been unable to satisfy myself that Maximowicz was right in this determination.]

I. cristata, Miq. in Ann. Mus. Lug. Bat. iii. p. 141 (1867).

Miq. Prol. Fl. Jap. p. 305 (1867), non Soland [cf. specimen (K)].

I. fimbriata, Klatt in Linnaea xxxiv. p. 619 (1866).

[quoad syn. *I. chinensis*, Bunge; see also *I. chinensis*, supra.]

I. tomiolopha, Hance in Journ. Bot. x. p. 229 (1872).

I. Rosthorui, Diels in Engl. Bot. Jahrb. xxix. p. 261 (1901).

[cf. specimen (B).]

I. germanica, *Somoku Zusetsu, ii. no. 2 (Japon. ichi-hatsu).

DISTRIBUTION. Central and South-Western China and possibly also in Northern Burma.

[N.B. This Iris has probably been cultivated in China for centuries and it is impossible to say whether it is only an introduction into Japan and Burma. Specimens from this latter locality were obtained by the Calcutta Botanical Garden a few years ago and distributed under the name of *I. nepalensis* Don. Those that I received proved to be identical with *I. tectorum* as also did those that were grown at Kew.]

Chekiang. Tientai, 1891, Faber (B).

Shensi. 1895-97, Giralddi, nos. 6678, 6687-6690 (B).

Hupeh. Ichang, 1885-88, Henry, no. 3781 (B) (K), no. 3970 (BM) (K).

Changlo, 1888, Henry, no. 6330 (K).

South Wushan, 1900, Wilson, no. 640 (B).

Nanto, 1900, Wilson, no. 486 (B).

Yunnan. 18—, Henry, no. 11821 A (E).

Yunnansen, 1906, Maire (E).

N. W. Yunnan; Lang-Kung, Hocking and Lichiang Valleys, 1906, Forrest, no. 2094 (K).

Mengtze, 18—, Henry, no. 9117 (K).

Szechuan. Nanch'uan, 1891, Rosthorn, no. 2403 (B). [This is the type of Diels' *I. Rosthornii*.]



The following specimens are probably from cultivated plants:

- Pekin, 1889, Bodinier (L).
 Ootacamund, 1856, Cleghorn (E).
 Yokohama, 1862, Maxim. (K).
 Shanghai, 1861-61, Maingay, no. 742 (K).

Diagnosis.

I. tectorum Evansia; *I. Milesii* haud dissimilis sed *rhizoma* pallide fuscum nec viride; *caulis* foliis subaequalis.

Description.

Rootstock, a stout, pale, buff-coloured rhizome with sessile shoots, not producing stolons, as do most of the other members of the *Evansia* section.

Leaves, thin, pale green, ribbed, 12-18 in. long by 1-2 in. broad, tapering to a point.

Stem, about 12 in. or rather more in a well-grown plant, bearing reduced leaves and one or two lateral heads.

Spathe, 2-3 flowered, valves green, pointed, 1½-2 in. long.

Pedicel, about ½ in., but becoming eventually somewhat longer.

Ovary, rounded, trigonal, green.

Tube, 1-1½ in., brown purple.

Falls, blade almost orbicular, marked with deep lilac veins and mottlings on a paler ground, crest white, marked with brown violet, deeply and irregularly laciniated; haft about half as long as the blade, with red lilac veins on a white ground, and wavy edges.

Standards, blade lilac, obovate, suddenly contracting to a short haft, of which the edges curl over to form a tube. The standards are spreading and slightly concave on the upper surface.

Styles, narrow, over an inch long.

Crests, quadrate, finely serrated.

Stigma, prominent, bilobed, blue.

Filaments, about equal in length to the anthers, colourless.

Anthers, cream coloured.

Pollen, white.

Capsule, oblong, rounded with 6 ribs, walls of thin tough texture, with a coarsely netted surface, rather more than 1½ in. long.

Seeds, numerous, globose or pyriform, dark black brown, with small but distinct cream-coloured aril.

Observations.

This fine *Iris* was first introduced into Europe by Siebold, who sent plants to St Petersburg, and it was one of these plants that provided the material for Regel's figure (*Gartenflora* t. 716). According to Bretschneider (*Bot. Sin.* iii. 154), the cultivation of this *Iris* in China can be traced back to the seventh century and it is now widely distributed over the country. The Chinese name for it is apparently Yüan wei, while in Japanese the same character is read Itsi hatsu (fide Dr Takeda). Kaempfer in his *Amoenitates exoticæ* (1712), p. 873, mentions it under the name of "itz fatz."

The name is derived from the fact that in Japan this *Iris* is largely grown on the ridges of thatched roofs, in the same way that *I. germanica* and other *Pogoniris* are commonly grown in Normandy at the present day. Clay is probably used to fix the plants in position.

In England the cultivation of this *Iris* is not really difficult, provided only that the rhizomes are thoroughly ripened in late summer, and that thorough drainage is provided at all times. When these conditions are not fulfilled, the plants are apt either to die entirely or more usually to lapse into a dormant condition and produce no flowering growths in the following season. For instance, the wet and sunless summer of 1910 so weakened my plants that flowers were scarce in 1911, but the effect of the hot summer of 1911 was very obviously shown by the sturdy growths made in that year.

Of late years an albino variety has appeared in cultivation, though whether it arose from seed in Europe or was introduced from the Far East is uncertain. *I. tectorum alba* has pure white flowers except for a few faint yellow veins at the base of the segments and on the white crest. The absence of blue pigment in this *Iris* acts as a Mendelian recessive character and consequently the seedlings raised from self-fertilised seed are all white flowered. I have raised more than a hundred seedlings of *tectorum alba* and found no variations. One curious fact has been that, although the blue type always has a branching stem, no albino plant has ever in my garden borne more than two flowers on an unbranched stem. However, this proved not to be a fixed character, for the same plants, when grown in the more genial climate of the Channel Islands, produced stems with lateral branches.

I. tectorum grows rapidly and seems quickly to exhaust the soil in which it grows. The plants should therefore be transplanted every two or three years and the operation will result in no loss of bloom if it is carried out in July or early August. Each new growth will form a flowering plant by the following year. The exact composition of the soil seems to be of no great moment.

Seeds are produced in abundance and germinate very readily. Unless, indeed, it is possible to winter the seedlings in a dry, airy structure, it is a mistake to sow the seed either in pots or in the open before October. Earlier sowings result in crops of seedlings in October and November, which are lifted entirely out of the ground by frost in winter and are thus liable to perish.

†‡ *I. GRACILIPES*

- A. Gray in Mem. Am. Acad. N. S. vi p. 412 (1859).
 Baker in J. L. S. xvi p. 143 (1877).
 Hdk. Irid. p. 22 (1892).
 Franch. et Savat. Enum. Pl. Jap. ii. p. 41 (1879).
 *Bot. Mag. t. 7926 (1903).
 Gard. Chron. xxxvi. p. 1 (1904).
 XLIV. p. 125 (1908).
 *Phonzo Zoufou XXIII. p. 12.

SYNONYM.

I. sibirica, *Somoku Zusetsu, II. p. 10 non L.

[N.B. The plant represented is clearly *I. gracilipes* but it is named *I. sibirica* L. as well as *Himeshaga*, which Dr Takeda tells me is the Japanese name of *I. gracilipes*.]

DISTRIBUTION. Japan, on wooded slopes with a cool aspect, in loose rich vegetable soil, in much the same conditions as those in which primroses thrive in England.

Japan, 1853-6, Wright (K).
 Prov. Nambu, 1865, Tschonoski (K) (BM) (V) (B).
 Kintoki, 1876, Bisset (K).
 Shinano (Togakushi), 1894, Watanabe (K).
 Daisen, 1899, Faurie (B).

Diagnosis.

I. gracilipes Evansia; *rhizoma* gracillimum; *folia* anguste ensiformia; *caulis* ramosus; *spathae* monophyllae, uniflorae; *tubus* ovario trigono triplo longior.

Description.

Rootstock, a slender, branching, comparatively wide-creeping rhizome.
Leaves, about a foot long eventually, $\frac{1}{3}$ in. broad, ensiform, slightly ribbed, green.
Stem, about 8-10 in., slender, branching about twice with a leafy bract at the bifurcations.
Spathes, with one valve only, lanceolate, membranous, scarious, reaching above the top of the tube.
Pedice, none or very short.
Ovary, trigonal with thin walls.
Tube, about $\frac{1}{2}$ in., funnel shaped.
Falls, obovate, cuneate, slightly more than an inch long by $\frac{1}{2}$ in. broad, deeply and widely emarginate, and bearing a wavy linear crest, which is yellowish white along the haft, becoming orange at the tip on the blade. At the base of the haft the ground colour is creamy white marked with brownish veins which become lilac towards the edge; the blade is of a pink lilac marked with deeper veins at the edge of a central patch of white veined with deep lilac.
Standards, oblanceolate, emarginate, with a short canaliculate haft, of a uniform pink lilac, under an inch long by $\frac{1}{4}$ in. wide, spreading at the same angle as the falls.
Styles, $\frac{1}{2}$ in., of the same pink lilac colour.
Crests, long, nearly $\frac{3}{4}$ in., much fimbriated.
Stigma, a triangular tongue.
Filaments, equal in length to the anthers.
Anthers, white.
Pollen, white.
Capsule, very short, under $\frac{1}{2}$ in. long, with bulging sides, almost trefoil in section.
Seeds, small, dark reddish-brown, pyriform, with conspicuous cream-coloured rhaphe.

Observations.

This is one of the most dainty of all Irises and does well in a cool, moist and yet not water-logged soil. It is not always easy to establish and should only be moved during the summer months while growth is still active. Division of the rhizomes is then possible. It may also be raised from seed, which sets fairly readily although in no great abundance, even if the flowers are carefully pollinated.

In structure, this Iris is peculiar in its single-valved spathes.

I. SPECULATRIX

Hance in Journ. Bot. XIII. p. 196 (1875).

XIV. p. 75 (1876).

* Bot. Mag. t. 6306 (1877).

[The dimensions given are fallacious, since they were taken from a plant that flowered immediately after its arrival in England; the tube and pedicel are stunted.]

Baker in Gard. Chron. 1876, II. p. 36.

in J. L. S. XVI. p. 143 (1877).

Hdk. Irid. p. 69 (1892).

Maxim. in Bull. Acad. Pét. XXVI. p. 538 (1880).

Mél. Biol. X. 735 (1880).

DISTRIBUTION. China, in the provinces of Kwangtung and Fokien.

Kwangtung; Hongkong, 1861, Martens (B).

Victoria Peak (Hongkong), 1874, Ford (K) (BM).

Canton; Lienchau, 1874, Lamont (BM).

Lantau Island, 1888, Native collector (K).

Hills above Repulse Bay, Hongkong, 1900, Tutchet, no. 669 (K).

Fokien; Foochow, 2000 ft. above the plain, 1897, Carles (K).

No locality, 1905, Dunn (K).

Diagnosis.

I. speculatrix Evansia; *rhizoma* squamosum, tortuosum, annulatum; *folia* rigida, linearia, nervis validis prominulis percursa, caulem bis superantia; *caulis* monocephalus; *spathae* biflorae; *pedicellus* longus; *tubus* brevis; *segmenta* exteriora cristata.

Description.

Rootstock, $\frac{1}{3}$ in. in diameter, the crowded relics of former leaves splitting up into fibres. The growth is very similar to that of *I. bracteata* and other Californian species.

Leaves, distinctly ribbed, 12—18 in. by $\frac{1}{4}$ — $\frac{1}{2}$ in., linear ensiform.

Stem, 5—12 in., bearing 2 or 3 reduced leaves.

Spathes, 2-flowered, $1\frac{1}{2}$ — $3\frac{1}{2}$ in. long, green, acuminate.

Pedicel, 1 in. at flowering time, afterwards $1\frac{1}{2}$ —2 in. long.

Ovary, $\frac{1}{2}$ in., with a tapering neck.

Tube, rather less than $\frac{1}{2}$ in. long.

Falls. The almost orbicular blade is much shorter than the pale red-purple haft and is of a bright red-purple colour with a patch of white at the end of the shallow bright-yellow crest.

Standards, pale lilac, oblanceolate, unguiculate, shorter than falls, erect.

Styles, of the same length and colour as the standards.

Crests, large, triangular.

Stigma,

Filaments,

Anthers,

Pollen,

Capsule, $\frac{1}{2}$ — $\frac{3}{4}$ in. long, tapering at either end, trigonal with a raised line on each face, shortly beaked.

Seeds, globular with white attachment as long as the diameter of the seed.

Observations.

Little is known of this *Iris* in cultivation although a plant once flowered at Kew. By the kindness of Mr S. T. Dunn and Capt. Basil Taylor, I was able to obtain a few seeds from Hongkong. For some reason, however, I failed to keep alive the few seedlings that germinated. Better success attended the one plant that germinated from a few seeds that I sent to the south of France. This plant is growing well in rather heavy limestone soil, although it has not yet flowered.

I. speculatrix would probably prove not to be hardy in England and could only be grown under glass, at any rate during the winter months.

Its relationship to the other members of the *Evansia* section is uncertain. Its seeds are certainly distinct and so is the whole appearance of the plant. It is possible that further knowledge of it would lead to a different classification.

† *I. CRISTATA*

(PLATE XXV)

Solander in Art. Hort. Kew. I. p. 70 (1789).

Smith, Spicilegium t. 13 (1791).

• Bot. Mag. t. 412 (1798).

• Red. Lil. VII. t. 376 (1813).

• Lodd. Cab. t. 1366.

Baker in J. L. S. XVI. p. 143 (1877).

Hdk. Irid. p. 23 (1892).

SYNONYM.

Neubeckia cristata, Alef. BZ. XXI. p. 297 (1863).+‡ *Var. lacustris*

SYNONYM.

I. lacustris, Nuttall, Gen. Amer. I. 23 (1818).

[N.B. This name may be retained as that of a local form or variety but it hardly deserves specific rank. Cf. Observations, p. 107.]

DISTRIBUTION. The Eastern United States.

Georgia. Lookout Mt, near the Tennessee Boundary, 1906, Churchill (K).

Whitfield Co., Gordon Springs, 1900, Harper (K).

South Carolina. 1841, Gray and Carey (K), 18—, Hb. Booth (C).

Oconee Co., Newry, 1906, House no. 1962 (W).

North Carolina. Broad River Cataract, 1841, Rugel (BM) (V).

Looking Glass Mt, Pisgah Forest, 1909, House no. 4160 (W).

Biltmore, 1896, Biltmore Hb. (K) (V).

Virginia. Marion Smyth Co., Middle Fork, Holston R. 1892, Small (K).

Campbell Co., 1872, Curtiss (BM).

Washington, D.C. 1896, Steele (E).*Kentucky*. Bath Co., 1833, Griswold (E).

Common along watercourses, 18—, Short (K).

Arkansas. 1837, Engelmann (B) and Hb. Braun (B).*Ohio*. Cleveland, 18—, Krebs (B).*Var. lacustris*. Wisconsin, 18—, Torrey (BM).

Lake Huron, Chicken Bay, 1871, Macoun (K).

*Diagnosis.**I. cristata* Evansia; *rhizoma* gracile, stolones plures emittens; *caulis* brevissimus, vix digitalis; *segmenta* omnia patentia, *exteriora* cristis tribus longitudinalibus undulatis loco barbae; *semina* appendice cartilaginea longa instructa.*Description.**Rootstock*, a slender rhizome, spreading by means of long stolons; in cultivation a single rhizome sends out as many as 6 or 8 of these stolons to form new rhizomes for the following year. In the wild state, growth often extends for 8—12 in. without any lateral shoots.*Leaves*, about 6 in. by $\frac{3}{8}$ — $\frac{1}{2}$ in. at flowering time, subsequently increasing to as much as 12 in. by 1 $\frac{1}{4}$ in.; ensiform, not very rigid, finely ribbed, of a somewhat yellowish green.*Stem*, short, not more than 1 in., bearing near the base 2—3 reduced leaves.*Spathes*, 1—2 flowered, green, sharply keeled, acuminate, slightly inflated, 2 $\frac{1}{2}$ —3 in.*Pedicel*, $\frac{1}{4}$ in.*Ovary*, trigonal, with a slight groove on each face, $\frac{1}{4}$ in. long, tapering at either end.*Tube*, 1 $\frac{1}{2}$ —4 in. long, distinctly trigonal, becoming wider above.*Falls*. The somewhat blunt and broad obovate blade is not separated by any constriction from the wedge-shaped haft, which bears three parallel ridges. The central ridge is crinkly, white, tipped with orange; those on either side are orange or brownish yellow on the inner face, beyond which the colour becomes lilac purple. On the blade the end of the central ridge or crest becomes white, tipped and dotted with lilac purple. Around this there is a white patch, edged with deep lilac purple, which shades away into the plain paler lilac of the rest of the blade.*Standards*, obovate unguiculate, emarginate, lilac purple.*Styles*, narrow, keeled, pale lilac.*Crests*, long, narrowly triangular.*Stigma*, oblong, entire.*Filaments*, white, tinged with pale mauve, attached to the base of the central ridge of the falls.*Anthers*, cream.*Pollen*, white.





Capsule, small, not much more than $\frac{1}{2}$ in. long, the outline being a pointed oval, the section trigonal with three sharp angles; it dehisces completely while still somewhat green and while still hidden in the persistent spathe-valves.

Seeds, small, brown, smooth, oval or globular, with curious, transparent, almost gelatinous appendages, often longer than the circumference of the seeds and twined round them. These appendages quickly shrivel on exposure to the atmosphere.

Observations.

This very distinct Iris has been known since the middle of the eighteenth century. There exists at the British Museum a specimen from Bartram's Herbarium, dated 1764 and described as "a sweet-scented plant, growing 5 in. high, which spreads much and differs from the Carolina dwarf Iris." The "Carolina dwarf Iris" is probably a reference to *I. verna*, with which *I. cristata* was at first confused, e.g. among Pallas' specimens (BM) which are labelled either *verna* or even *pumila*.

This confusion is hardly a matter for surprise in view of the fact that in Kentucky, at any rate, *cristata* and *verna* are sometimes found in company, though *verna* is usually found at a greater elevation than *cristata* (cf. note on Short's specimen (K)).

The points of agreement between *I. cristata* and *I. lacustris* are so many and they are both separated by so many characters from all other Irises, that it seems impossible to give both specific rank. It is true that *I. lacustris* is usually smaller than *I. cristata* but this character tends to disappear when seedlings are raised, though even in seedlings the closer growth of the more slender rhizomes is still apparent. However, there is no difference except size in the growth of the two plants and size alone is often a matter of soil and climate. Moreover, as the smaller plant comes from the colder, northern region, we are surely justified in looking upon *I. lacustris* as a mere local form of *I. cristata*.

As garden plants, both do well in moist soil composed of humus and gravel, in the kind of soil, in fact, in which they grow in their native home on the banks of streams. Both are quite hardy and *I. lacustris* has, or, at any rate, some plants of it have, a curious habit of flowering at odd times from May until October.

Propagation is easy and is best carried out by cutting away the side-growths soon after the flowering season. The points of the new roots will then be apparent and each of these stolon-like growths is capable of becoming a flowering plant by the next year. Each rhizome that has flowered withers and dies and may therefore be at once discarded, for no fresh lateral growths will make their appearance from it. The plants benefit greatly by this annual remaking of the plantations, and the opportunity should be taken of adding fresh supplies of well-decayed leaf-soil.

I. cristata does not produce seed very readily in cultivation in this country. Even when a few capsules are obtained as the result of artificial pollination, the seeds in each are not numerous. Moreover, germination appears to be difficult, for though I have regularly sown seeds of *I. cristata* for several seasons past, none have ever germinated except a few from one pod of the variety *lacustris*.

An albino form of this Iris has recently appeared in commerce. It is uncertain whether *I. cristata alba* was found wild or whether it is of garden origin, although there is reason to believe that it has been found among collected plants.

THE ONCOCYCLUS SECTION

This group is probably the most difficult of all for botanists and gardeners alike. The former can only in the case of very few species find specific differences that can be recognised in herbarium specimens and the latter finds it almost impossible to induce the plants to live on from year to year in our capricious climate.

The meaning of the word *Oncocyclus* is not apparent, for Siemssen, its inventor¹, contented himself with the remark that it is composed of the words *ὄγκος* and *κύκλος* but vouchsafed no indication of the meaning that he attached to the compound. We may conjecture that it may have had some reference to the character of the seeds, see Plate XLVIII, Fig. 8, which are distinguished from those of all the other groups by the large creamy-white aril, which is sometimes as large as the seed itself. All the *Oncocyclus* species or varieties agree in the possession of seeds of this type and, except perhaps in size there is no apparent difference by which to distinguish those of any one of them.

The other characters which all *Oncocyclus* Irises have in common are:

1. The bright red-skinned rhizome with crowded growths with occasional and irregular extensions by means of stolons (see Plate XLVII B representing an extreme example of this system of growth in the Regelia *I. stolonifera*).

¹ Cf. BZ. 1846, p. 705.

II. The unbranched, one-flowered stem, surmounted by a long, tubular, unkeeled, green spathe, which reaches above the top of the perianth tube.

III. A broad diffuse beard of scattered hairs, not set in a line as in the *Pogoniris*, and beyond this a so-called signal patch of a deeper colour than the rest of the flower.

The foliage is very variable and its shape probably depends to a very large extent on the conditions in which the plant grows. I have seen a remarkable instance of this in a bed of seedlings of *I. iberica*, raised and growing in the south of France. These had upright leaves nearly as wide as those of *I. susiana* and had almost entirely lost that extremely falcate character which is so marked in the leaves of wild and collected plants. Moreover, Foster noticed years ago that seedlings of *I. iberica*, which he raised at Shelford, had such erect, narrow leaves that "they might almost be mistaken for young seedlings of *I. sibirica*." In subsequent years the foliage became more falcate, and it may be that this will eventually happen to my French friend's plants. In any case, it is obvious that no great reliance can be placed on the more or less falcate nature of the foliage as a mark of specific difference.

This must accordingly be sought in the flowers alone and chiefly in the shape of the segments. If we subject the *Oncocyclus* Irises to the same criteria as those to which we have submitted the members of the other groups, we shall have to admit that colour alone is no true specific difference. Consequently, we must refuse to look upon many of the so-called species of *Oncocyclus* Irises as such and merely regard them as sub-species or local varieties. This view is supported by the fact that many of them are apparently very local in their distribution.

In order to avoid confusion, however, the usual names will be kept, but always with the reservation that in speaking of an *Oncocyclus* Iris the word "species" is used with special signification. Plants like *I. paradoxa* with the extraordinary, narrow, velvety falls, *I. iberica* with its concave falls, or *I. acutiloba* with its pointed segments have obviously more valid claims to specific rank than *I. Gatesii* and *I. Lortetii*, *I. Bismarckiana* and *I. atrofusca*, which only differ from one another and from *I. susiana* in their colouring.

The distribution of the various species and their relative affinity to one another are both curious. We may divide the whole group into two sets, one occurring in Central and Eastern Asia Minor, Transcaucasia and the mountainous districts of Northern and Western Persia, and comprising the smaller and more easily distinguished species, and the other confined to Palestine, Syria and Mesopotamia and containing the taller, less hardy and more closely allied species. There is one plant, *I. Mariae*, from the borders of Palestine and Egypt, which does not fit into this arrangement, unless, as seems not improbable, it is a mere stray colony of *I. Barnumae* from the neighbourhood of Kharput.

Roughly speaking, the species comprised in the first of these two sets are, as we might expect of plants from mountainous regions, slightly more hardy than the second set from hotter situations on Lebanon, the Hauran and further east in Mesopotamia.

No one has yet been able to lay claim to permanent success in cultivating these difficult Irises, although the fascination of their colouring and the whole appearance of the striking flowers is a constant appeal to renewed efforts. The chief difficulty undoubtedly lies in providing a sufficiently long period of rest or rather of retarding the growth without injury to the plant until such time as the plants need no longer fear the disastrous effects of the alternations of frost and muggy moisture that we experience in an English winter. In ordinary circumstances *Oncocyclus* plants in the open ground begin to grow strongly in September and October and have thus almost reached in midwinter that stage of their development at which the flower stems should be produced. The foliage, however, is so buffeted and damaged by the weather that the vitality of the plants is impaired with the result that, when the warmer days of spring at last arrive, the plants have no longer sufficient vigour to send up their flowers.

The following suggestions may be of use to those who wish to make another effort to cultivate these baffling plants.

Position. A dry sheltered site for the beds is essential, and some means must be contrived for throwing off rain in late summer and early autumn. Either narrow raised beds can be thrown up and portable lights arranged over them, when necessary, always remembering that these must be so constructed as to allow a free circulation of air: or, preferably, a bed can be raised against a south wall with the surface sloping sharply towards the south, so that excessive moisture at any time drains off before much has time to penetrate into the soil. In such a position, too, it is easy to arrange a glass roof over the plants and so obtain the dry warm soil that is necessary to ripen the rhizomes.

Soil. Almost the only soil in which *Oncocyclus* Irises have been known to live on from year to year is the red loam from limestone formations so familiar on the Mediterranean coast of France. Failing this we must fall back on some fairly heavy soil, not deficient in lime, and mix with it some grit either in the form of limestone chips or mortar rubble. Organic manure must be avoided, for it seems probable, though it is not proved, that this either directly engenders disease or leads to gross growth which does not ripen satisfactorily. Old leaf soil in moderate quantity and small doses of a complete chemical manure may be given with advantage.

Planting. If plants can be obtained with their thick fleshy root-fibres not too much damaged, they may be planted in the first week in October with some hope that a fair proportion will survive the

winter. If, however, only the ordinary trade-supplies are available, it is advisable to pack up the rhizomes in some such material as buckwheat husks and send them to be cold-stored at a temperature of 30—32° Fahr. until about the end of February. Then they can be planted in the open ground and should grow quickly with a far greater chance of success than those autumn-planted rhizomes, which had no chance of anchoring themselves in the ground before the frosts came.

One fact must not be forgotten and that is that healthy plants put forth new root-fibres soon after the flowers have faded. In the wild state the ground is probably by that time so quickly becoming parched that these roots, even if they develop fully, are not induced to send out lateral branches until the ground becomes moist once more in autumn. In cultivation here it will be found that, if the plants are lifted soon after the flowers have faded, these straight thonglike roots will remain dormant until the autumn and quickly branch out as soon as they come into contact with moist earth again. It is therefore important that these roots should be preserved intact, if an annual lifting is practised, instead of covering the plants with lights, as a means of providing the necessary resting period. (The alternative of lifting the plants is not to be recommended, for the annual upheaval makes it impossible for the plants ever to become really established or to do themselves justice.)

Directions for dealing with *Oncocyclus* seeds will be found in the chapter on raising Irises from seed at the end of the book.

The members of the *Oncocyclus* section all agree in possessing:

1. Seeds with a large, creamy-white aril.
2. An unbranched stem, bearing a single flower.
3. Green, narrow, unkeeled, almost tubular spathes.
4. A tube slightly longer than the elongated tapering ovary.

The various species¹ may be separated as follows:

- | | | |
|------|--|----------------------------------|
| { | Plant slender, leaves narrow, not more than $\frac{1}{2}$ in. wide, stem not more than 6, or at most 8, in. long. | 1 |
| { | Plant stouter, leaves broader, stem usually at least a foot and sometimes two feet long. | 8. |
| 1. { | Outer segments short, narrow, strap-shaped, only a quarter or a third the width of the inner segments. | <i>I. paradoxa</i> (p. 110). |
| { | Outer segments more than half as large as the inner segments. | 2. |
| 2. { | Outer segments deflexed, concave on the upper surface. | <i>I. iberica</i> (p. 111). |
| { | Outer segments extended horizontally for at least half their length, convex on the upper surface. | 3 |
| 3. { | Flowers concolor, not conspicuously veined. | 4. |
| { | Flowers conspicuously veined. | 5. |
| 4. { | Flowers yellow or red purple with signal patch of a deeper shade of the same colour. | <i>I. Barnumae</i> (p. 115) |
| { | Flowers purple black with a yellow signal patch. | <i>I. atropurpurea</i> (p. 122) |
| 5. { | Veins thin, leaving the ground colour clear and unobscured. | 6. |
| { | Veins thick, diffuse, tending to obscure the ground colour. | 7. |
| 6. { | Segments tapering, falls extending horizontally. | <i>I. Ewbankiana</i> (p. 112). |
| { | Segments tapering, falls reflexing beyond the middle. | <i>I. acutiloba</i> (p. 113). |
| 7. { | Segments broad, standards orbicular. | <i>I. Sarr</i> (p. 114). |
| { | Segments oblong, standards tapering. | <i>I. meda</i> (p. 117). |
| 8. | The Palestine or Syrian group of closely allied forms, which can only be separated by their colour. | |
| i. | Flower immense, of a pale grey, produced by delicate faint purplish veins on a silvery-white ground. | <i>I. Gatesii</i> (p. 117). |
| ii. | Standards faintly veined with pale violet on white, falls dotted and veined with crimson or red brown. | <i>I. Lortetii</i> (p. 118). |
| iii. | Standards heavily veined with blue or purple, falls closely dotted and veined with dark purple on a yellow ground. | <i>I. Bismarckiana</i> (p. 119). |
| iv. | Segments closely veined and dotted with deep violet black on a grey-white ground. | <i>I. susiana</i> (p. 120). |
| v. | Similar to iv. but less closely veined, so that the grey-white ground is much more conspicuous. | <i>I. sofarana</i> (p. 121). |
| vi. | Standards veined and dotted with reddish black on grey, falls similar but with the ground colour almost entirely hidden. | <i>I. atrofusca</i> (p. 121). |

¹ N.B. In this section, more weight is given to colour than in any other. If this character is left out of consideration, it becomes impossible to separate several plants which bear specific names. It seems desirable to make some concession here to horticultural convenience.

† *I. PARADOXA*

- Steven. in Mem. Soc. Imp. Nat. Mosc. v. p. 355 (1817).
 Bieberstein, Fl. Taur. Cauc. III. p. 41 (1819).
 Ledebour, Fl. Ross. IV. p. 105 (1853).
 • Trans. Russ. Hort. Soc. 1863, t. 112.
 • Gartenflora, 1863, t. 386, Fig. 3.
 Baker in J. L. S. XVI. p. 142 (1877).
 Hdk. Irid. p. 20 (1892).
 Boiss. Fl. Or. v. p. 132 (1884).
 • Bot. Mag. t. 7081 (1889).
 • Radde, Kauk. Mus. II. t. 1 (1901).
 • Lynch, Bk of Iris, p. 49 (1906).

SYNONYM.

Oncocyclus paradoxus, Siemss. in BZ. 1846, p. 706.

Var. *Choschab*, Hoog in • Gard. Chron. 1901, I. p. 104.
 • Garden, 1901, p. 248.

[This variety is similar to the type except that the standards are nearly pure white, with faint violet veins. Baker (Hdk Irid. p. 20) was mistaken in describing the type as having white standards, for the original description calls them violet and his var. *violacea* is therefore nothing but the type. The form with white standards was imported by the firm of van Tubergen and given the name of Choschab from the district from which it came. More recently it has been rediscovered by Schelkownikow near the village of Kosmalian in the neighbourhood of Lenkoran in Talysch. His specimens were described under the name of *I. Medwedewi* by Fomin in Monit. Jard. Bot. Tiflis, 1909, no. 14, p. 43.]

DISTRIBUTION. Transcaucasia, Armenia and Northern Persia.

- Transcaucasia* Elizabethpol, 18—, Hb. Besser (K).
 1834, Hohenacker (K) (B) (V).
 Helenendorf, 1838, Hohenacker (C).
Armenia. Van, 1899-1900, Maunsell (BM).
 Seid Khadji, 18—, Aucher Eloy, no. 5343 (K) (BM).
Northern Persia. Aderbeidjan; Khoi, 18—, Fischer (Hb. Hooker) (K).
 18—, Szovits (K) (B) (V).

[As far as can be seen from dried specimens these are the variety Choschab.]
 Mt Elburz, 1848, Buhse (V).

Diagnosis.

I. paradoxa *Oncocyclus*; ab aliis ob segmenta interiora exteriora villosa multoties excedentia facile dinoscitur.

Description.

Rootstock, a slender rhizome with crowded shoots.

Leaves, dwarf, narrow, falcate, resembling those of *I. iberica*.

Stem, 4-6 in. long, bearing a reduced leaf.

Spathes, green, clasping the tube, 2 in. long, 1-flowered, somewhat inflated and very slightly tinged with purple at the extreme edge.

Pedicel, very short.

Ovary, trigonal, under an inch long, pointed at either end.

Tube, $\frac{1}{2}$ — $\frac{3}{4}$ in.

Falls, strap-shaped, extended horizontally with nearly parallel edges. The end is rounded and slightly emarginate. The groundwork is a pale crimson or light purple, almost completely covered along the centre with black-purple hairs, giving the whole surface the appearance of black velvet. At the edges there are thick black-purple veins. About half an inch from the upper end there is a narrow cross band of pale pinkish crimson, beyond which the ground colour is almost obscured by thick black-purple veins; 2 in. long by $\frac{1}{2}$ — $\frac{3}{4}$ broad.

Standards. The orbicular blade narrows gradually to the short haft, which bears a number of blue or violet hairs. The bluish-white ground colour is closely veined with thick deep blue-violet veins and dotted with the same colour.

Styles, of a brownish-yellow colour, closely covered with dark brown-purple spots arranged in lines.

Crests, very small, with finely serrate edges.

Stigma, entire, prominent, oblong.

Filaments, tinged with purple.

Anthers, cream.

Pollen, cream.

Capsule, 2 in., rounded trigonal, tapering gradually at either end.

Seeds, globose with large creamy aril.

Observations.

This Iris was rightly named *paradoxa*, "the unexpected," for its standards are four times as wide as the falls, which look and feel like a narrow strip of black velvet.

It is not a robust species nor is it at all easy to keep from year to year in England. It was partly for this reason that Foster crossed this Iris with several strong-growing Pogoniris, such as *I. variegata* and *I. pallida*. The result in each case was a plant midway between the two parents, less vigorous than the Pogoniris but yet able to grow on from year to year under ordinary cultivation. The feature of both *parvar* (or *parsam*, for Foster himself told me that he had forgotten exactly what Pogoniris he had used) and *parpall*, which obviously resembles a *pallida*, is the broad velvety beard, which however is not quite so dense as that of *I. paradoxa* but allows the light ground colour to be seen.

For cultivation see the remarks on the *Oncocyclus* group on p. 108.

†*I. IBERICA*

Hoffmann, Descr. Plant. Iber. etc. 1806 in Comm. Soc. Phys. Mosq. I. p. 41 (1808).

Steven. ex Bieb. Fl. Taur. Cauc. I. 30 (1808).

*Trans. Russ. Hort. Soc. 1863, t. 112.

*Gartenflora, t. 386 (1863).

[N.B. This plate shows the type and a variety *ochracea* in which the ground colour is bright yellow.]

*Gartenflora, t. 713 (1872).

*Revue Horticole, 1873, p. 370.

*Flore des Serres, t. 1963 (1873).

Baker in J. L. S. XVI. p. 142 (1877).

Hdk. Irid. p. 60 (1892).

*Radde, Kauk. Mus. II. t. 1 (1901).

*Lynch, Book of Iris, p. 106 (1904).

SYNONYMS.

?*I. georgica*, Gueldenstadt, Reise, t. 420 (1787).

I. Helena, C. Koch in Linnaea, XXI. p. 639 (1848).

Regel in Gartenflora, 1872, p. 34.

?*I. Heylandiana*, Boiss. et Reut. ex Baker in J. L. S. XVI. p. 142 (1877); see also p. 120.

I. susiana, Zeller, Holy Land (1876).

Oncocyclus ibericus, Siemss. BZ. IV. p. 706 (1846).

DISTRIBUTION. The Transcaucasian Provinces of the Russian Empire, Armenia and Northern Persia.

Caucasus. No locality, 1831, Prescott (K).

Tiflis, 18—, Fischer (K).

18—, Szovitz (K) (B).

Kisich (? Kasach) on R. Akstafa, 1842, Hohenacker (BM) (V).

Armenia. Erzeroum, 18—, (K).

18—, Calvert (C).

Persia. Aderbeidjan, 18—, Aucher Eloy (K) (V).

Diagnosis.

I. iberica *Oncocyclus*; ob segmenta exteriora concava, interioribus multo saturatiora facile dinoscitur.

Description.

Rootstock, a slender rhizome, spreading by means of stolons.

Leaves, 5 to 6 to a tuft, often very falcate, linear, glaucous, 4—6 in. long, $\frac{1}{4}$ — $\frac{1}{2}$ in. broad.

Stem, one-flowered, 3—6 in. high, bearing a single bractlike leaf about the middle, and springing from a tuft of 3—4 reduced leaves.

Spathe valves, lanceolate, acute, 2—3 in. long, reaching above the tube, green, often flushed with pale pinkish purple.

Pedicel, very short.

Ovary, cylindrical.

Tube, greenish, cylindrical, an inch long.

Falls, at first horizontal, but rapidly becoming deflexed, distinctly concave, the blade of an orbicular or rounded oblong shape and the haft broad. In the centre of the blade is a triangular signal patch of purplish black, the apex lying under the style, outside which the colouring consists of a close network of irregular thickset brownish-purple veins on a whitish-yellow ground. The diffuse beard consists of short purple-brown hairs. $2\frac{1}{2}$ —3 in. long by 2 in. broad.

Standards, connivent, the blade orbicular, with a short haft, much paler and often smaller than the falls, the colouring being composed of faint dots and broken veins of purplish brown or bluish purple on a silvery-white ground, $2\frac{1}{2}$ in. long by 2 in. broad.

Styles, deflexed very abruptly, lying close down on the falls, with a slight median ridge, very convex, of a dark purplish brown colour at the base, the upper part being almost cream, dotted with brown purple.

Crests, small, triangular, reflexed, closely dotted and mottled with red brown.

Stigma, entire, of a light purplish brown colour.

Filaments, pale purplish yellow.

Anthers, long, cream.

Pollen, cream.

Capsule, trigonal, tapering ellipsoid, dehiscing below the apex.

Seeds, globose or pyriform, red brown, with a large cream-coloured aril.

Observations.

This Iris has been in cultivation for a number of years, and in some gardens has become more nearly acclimatized to the climatic conditions of western Europe than any other *Oncocyclus* Iris except *I. susiana*.

There is little doubt that this species varies in colour to some extent. For instance, in Foster's notes I find that in 1889 he received a form that was sent to him from Van in Armenia by Dr Reynolds, and of which the standards were a pure creamy white, with only a few black-purple veins on the inside of the haft. The falls were closely and irregularly reticulated with red brown, the signal patch being nearly deep crimson. In the variety *insignis*, van Houtte (Gard. Chron. 1879, i. p. 693, fig. 100), the standards are dark, almost as dark as the falls. Regel's var. *ochracea* (Gartenflora t. 386 (1863)) has a yellowish ground, and Baker's var. *Bellii* (Hdk. Irid. p. 20) has dark lilac standards. The variety *Perryana* (Florist, 1873, 25, and Baker l.c.) resembles this latter.

All agree, however, in possessing the curious spoon-shaped concave falls and depressed style branches, which give the flower an appearance quite unlike that of any other Iris.

Reference has already been made (see p. 108) to the slender, erect and not falcate leaves borne by seedlings in their first season, and it may well be that the falcate character of the leaves of wild plants is largely the result of the conditions in which they grow, and not necessarily inherent in them.

†*I. EWBANKIANA*¹

*Foster in Gard. Chron. XXIX. i. p. 397, fig. 152, p. 407 (1901).
Revue Horticole, 1901, p. 399.

Var. *Sprengeri*; see Observations.

SYNONYM.

I. Sprengeri, Siehe in Gard. Chron. 1904, II. p. 50.

Var. *Elizabethae*; see Observations.

SYNONYM.

I. Elizabethae, Siehe in ABZ. 1905, p. 115.

DISTRIBUTION. Northern Persia and Asia Minor. Foster's plants were sent to him by van Tubergen (MS), whose collector found them in the mountains that separate the Russian province of Transcaucasia from Persia at a distance of 120 versts from Askabad (Gard. Chron. l.c.).

Diagnosis.

I. Ewbankiana *Oncocyclus*; *planta* gracilis; *segmenta* exteriora lanceolata, convexa, patentia, *venis* tenuibus conspicuis notata.

Description.

Rootstock, a slender rhizome, very similar to that of *I. iberica*.

Leaves, glaucous, very narrow and somewhat falcate, 6—8 in. long.

Stem, 2—4 in. high, bearing 2—3 reduced leaves.

Spathe valves, narrow pointed, not inflated, reaching above the tube, quite green and persistent after flowering, 2½ in. long.

*Pedice*l, very short.

Ovary, bright green, cylindrical, thin walled, longer than the tube, 1 in. long.

Tube, about ½ or ¾ in., green, with vertical brown-purple stripes.

Falls, lanceolate, pointed, with a broad but not very dense beard of stout yellow hairs, tipped with brown. The ground colour is a creamy white, marked by conspicuous irregular or jagged veins of a brown purple colour. The blade is convex and projects horizontally, with no tendency to be recurved. Signal small but conspicuous, of dark purple, almost black colour.

Standards, obovate-lanceolate, of a creamy white ground colour, veined all over with jagged brown-purple veins, which are broader, more jagged and broken over the lower than over the upper part. On the haft, which sometimes bears about a dozen yellow, brown-tipped hairs, the veins tend to break up into dots.

Styles, much arched, of an almost uniform chocolate brown, short.

¹ Named after the Rev H. Ewbank of Ryde, a devoted cultivator of *Oncocyclus* Irises.

Crests, quadrate, marked with thin, broken, brown-purple lines.
Stigma, oblong, entire.
Filaments, short, brown-purple.
Anthers, large, cream.
Pollen, dingy greenish yellow.
Capsule, cylindrical, with six low ridges, tapering at either end.
Seeds, small, of the usual *Oncocyclus* character.

Observations.

This Iris comes near to *I. acutiloba* and *I. meda*, but it is distinguished by its lanceolate outer segments, which are extended horizontally and show no tendency to be recurved, as is conspicuously the case in the two above mentioned species. The small sharply defined signal is also a marked character.

The figure in the Gardeners' Chronicle (l.c.) is somewhat misleading, for the plants that I have grown and seen growing¹ had stems not more than 4 in. high, and this is confirmed by Foster's note, "scape exclusive of flower 2½—3 in." (MS.).

It seems best to class with this Iris both *I. Sprengeri* and *I. Elisabethae*, which by Siehe's own admission are very closely allied. As garden plants it may be possible to distinguish them, but from the botanical point of view they must surely be included under one species.

The variety (†) *Sprengeri*, which is said to grow in the Lycaonian Taurus at a height of 6500 ft. (Siehe in Gard. Chron. l.c.), is of the same size as *I. Ewbankiana*, but the colouring is slightly different, being produced by purple-red veining on a clear yellow ground.

The variety (†) *Elisabethae*, from volcanic sandy districts in Central Cappadocia (Siehe in letter), is in cultivation somewhat larger perhaps, and is said to have a groundwork of paler yellow, with purple-brown veins.

My own experience of these plants has been that the groundwork is apt to vary slightly in colour and that the yellow shade is seldom conspicuous. The usual colour is a grey white, which looks perhaps somewhat yellow from the juxtaposition of the crowded red-brown veins. None of them grow rigorously, and all are apt to collapse after flowering unless special precautions are taken to keep the ground dry and warm.

+*I. ACUTILOBA*

- C. A. Meyer in Verz. Pfl. Cauc. p. 32 (1831).
- Trautvetter in Act. Hort. Petrop. I. p. 24 (1870).
- Regel, Gartenflora, 1874, p. 323, t. 812.
- Baker in J. L. S. XVI. p. 142 (1877).
- Hdk. Irid. p. 20 (1892).
- Boiss. Fl. Or. v. p. 132 (1884).
- Act. Hort. Tiflis, VI. 3, p. 42 (1904).

SYNONYMS.

Oncocyclus acutilobus, Siemss. in BZ. 1846, p. 709.

[N.B. *I. acutifolia*, Meyer in the Index Kewensis is presumably a misquotation for *I. acutiloba*, for no such name occurs in the reference given, Gartenflora, 1874, p. 323.]

I. Polakii, Stapf in Denkschr. Acad. Wien (Bot. Ergeb. Polak. Exped. Pers.), L. p. 20 (1885).

[N.B. The dark purplish beard, the dark violet or black purple signal spot and the reflexed falls all combine to make it impossible to separate this Iris from *I. acutiloba*]

DISTRIBUTION. Transcaucasia.

- Transcaucasia, 18—, Kolenat (V).
- Caucasus, 18—, Radde (K).
- Iberia, 18—, Hb. Besser (K).
- Elizabetopol, 1834, Hohenacker (K) (C) (V) (E).
- Karabagh (Schachbulagh), 18—, Fischer (K).
- Bailowo, 1900, Sintenis (V).

Diagnosis.

I. acutiloba *Oncocyclus*; *I. Ewbankianae* haud dissimilis, sed *segmenta* exteriora revoluta.

Description.

- Rootstock*, a short compact rhizome, with crowded tufts.
- Leaves*, ¾—1 in. broad by 3—4 in. long at flowering time, linear, more or less falcate.
- Stem*, 1-headed, short, 1½—4 in.
- Spathe valves*, lanceolate, pointed, green, 2 in. long, 1-flowered.
- Pedicel*, very short.
- Ovary*, trigonal.

¹ The rhizomes came from Foster's garden at Shelford and were part of the original importation.

Tube, cylindrical, an inch long, green, with purple mottlings.

Falls, creamy white, with thick brownish veins; in front of the styles there is a conspicuous brown signal patch; the beard is diffuse and composed of brown hairs; the lanceolate blade is not separated by any constriction from the broad haft, but is sharply reflexed.

Standards, broader and longer than the falls, much veined with dark purple-brown on a creamy white or grey ground.

Styles, much dotted with brown and coming close down on to the falls.

Crests, small, deltoid, reflexed laterally not vertically.

Stigma, entire.

Filaments, greenish.

Anthers, green, with dark edges.

Pollen, greenish, yellow.

Capsule, trigonal, tapering at either end, especially to the apex and dehiscing below the apex.

Seeds, nearly spherical, somewhat wrinkled, dark brownish red, with a very conspicuous yellowish-white aril, sometimes almost as big as the seed itself.

Observations.

There appear to be a number of local forms of this *Iris*, some of which are described in the article already quoted in the Bulletin of the Tiflis Botanic Garden. The varieties there mentioned are:

var. *typica*, Trautvetter (l.c.). The standards are much longer than the falls on which the veins gradually fade away towards the margin.

This variety is said to be found near Baku.

var. *lineolata*. The segments are all approximately equal and the veins on the falls are deep in colour and tend to grow thicker instead of fading away as they approach the edge. The falls of this variety are said to extend horizontally and it is possible therefore that this is a synonym for *I. Etebankiana*.

The locality is given as Diabar in the Swant district on the right bank of the Cyri¹.

var. *Schelkorenikowii* has larger flowers with very dark standards and a yellow beard on the falls. It comes from the Karadscha-dagh and the Bosdagh on the left bank of the Cyri².

var. *limaculata*, I can find no description of this variety, of which however I have received seeds through the kindness of M. Fomin of the Tiflis Botanic Garden.

†*I. SARI*³

(PLATE XXVI)

Schott ex Baker in Gard. Chron. 1876, I. p. 788.

Baker in J. L. S. XVI. p. 142 (1877).

Hdk. Irid. p. 19 (1892).

Boiss. Fl. Or. v. p. 131 (1884).

Siehe in Gard. Chron. 1904, II. p. 147.

SYNONYMS.

I. lupina, Foster in Gard. Chron. 1887, I. 738.

Baker, Hdk. Irid. p. 19 (1892).

*Garden, Feb. 18, 1893.

*Bot. Mag. t. 7904 (1903).

I. Manissadjani, Freyn in Bull. Herb. Boiss. IV. p. 180 (1896).

[N.B. This is described as coming from the Karaman Mt. near Amasia, but no mention is made of *I. Sari* or of *I. lupina*.]

Var *lurida* from Cilicia Boiss. Fl. Or. (l.c.).

[N.B. This is not the *I. Sari lurida* of the Bot. Mag. 6960 (1887), which represents *I. Bismarkiana* (p. 119).]

DISTRIBUTION. The mountainous region stretching from Eastern Cilicia in a north-easterly direction towards Harput and north to Amasia.

Cilicia: Gorumse on Kassan Oghlou in the Bakhyr Dagh, 1859, Kotschy (V).

Harput: Buslutasch, 1889, Sintenis (K) (B) (V).

Amasia, 1886, Yusuf (Foster MS.).

1902, Sprenger (Foster MS.).

Diagnosis.

I. Sari *Oncocyclus*; *planta* magnitudine *I. ibericae*, cui vero haud dissimilis; *venis* diffusis magis conspicuis, *segmentis* exterioribus convexis differt.

Description. (The form here described is perhaps the commonest; for others see Observations.)

Rootstock, a compact fleshy rhizome of the usual *Oncocyclus* type.

Leaves, about 6 to a tuft, linear, light green, rather glaucous, 9—12 inches long at flowering time. In some instances the leaves are straight, in others distinctly falcate.

¹ Cf. *Fomin in Act. Hort. Tiflis, VI. p. 42 (1904).

² Cf. *Fomin in Act. Hort. Tiflis, VI. p. 44 (1904).

³ Named after the River Sar in Cilicia near which the plant was found.





Stem, about 6 inches, almost entirely concealed by two sheathing leaves.

Spathe valves, 3—3½ in. long, pale green, scarious at very tip only, pointed, slightly ventricose and keeled, reaching considerably beyond the top of the tube.

Pedicel, very short.

Ovary, rounded hexagonal, almost cylindrical, with thick walls, ¾ in. long.

Tube, 1½ in. long.

Falls, 3 in. long by 1½ broad. The broadly canaliculate haft gradually widens into a lanceolate blade, with a rounded but yet pointed apex. Along the haft and the lower part of the blade the edge is merely wavy, but it then becomes serrate and at the apex is coarsely indented. The ground-colour of the blade is yellow or yellowish green, marked with irregular broken brownish-red veins. In the centre there is a blotch of rich dark reddish black. Along the haft and on to the blade runs a broad diffuse beard of bright yellow hairs, flanked by yellowish hairs tipped with brown.

Standards, 3¾ in. long by 2½ broad, connivent and folding one over the other, suborbicular with a short haft bearing a number of reddish-brown hairs. The ground colour is yellowish green, marked with abundant blotchy veins of brown red, which, especially in the upper part, almost hide the ground colour.

Styles, 1½ in. long by ⅙ broad, very convex and coming close down on to the fall, of a greenish yellow colour, veined and dotted with faint brown red.

Crests, large, quadrate, with coarsely and prominently serrate margin, marked with brown-red veins. *Stigma*, entire.

Filaments, short.

Anthers, large, longer than the filaments.

Pollen, yellowish white.

Capsule, trigonal, ellipsoid, tapering, of the usual *Oncocyclus* type.

Seeds, pyriform, dark reddish brown, with conspicuous cream-coloured aril.

Observations.

This curious Iris was first found by Theodor Kotschy in 1854 near the River Sar, in the neighbourhood of Kassan Oghlou, in Eastern Cilicia. Owing to some mistake, when *I. Bismarckiana* was first brought into cultivation, it was named *I. Sari* var. *lurida*, and plate 6960 in the Botanical Magazine depicts the plant under this name. In the meantime Foster received plants from Mrs Barnum from the mountains south of Kharput, which he, when they proved to be quite distinct from *I. Bismarckiana*, described as a new species under the name of *I. lupina*. The consequent confusion was not cleared up until Siehe rediscovered Kotschy's plant in the same district where it was found originally (cf. Siehe in Gard. Chron. l.c.). His article states that *I. Sari* is very variable in colour and, though specimens with a bluish ground do occur, they are rare. This is significant in view of the fact that the original description gives lilac as the colour of the flowers.

The commonest form has a groundwork on the falls of pale yellow, which sometimes, however, assumes a distinctly green tinge. On the standards the underlying colour varies from yellow to white or even to a lavender blue, and this is shaded and veined with lilac, purple brown or more often chestnut brown.

Foster's name of *I. lupina* was most appropriate, for the flowers have a curious tawny grey appearance, which is set off by the red signal patch. The whole effect is perhaps more striking than beautiful, and it is a pity that the plant is so difficult to manage in our climate, where it seems impossible without elaborate care to keep it alive for more than two or three years.

*I. BARNUMAE*¹

Foster and Baker in Gard. Chron. 1888, II. p. 182.

*Baker in Bot. Mag. t. 7050 (1889).

Hdk. Irid. p. 21 (1892).

*Lynch, Bk. of Iris, p. 105 (1906).

+Var. *urmiensis*.

SYNONYMS.

I. urmiensis, Hoog in *Garden, 1900, p. 375.

*Gard. Chron. 1900, II. p. 373, fig. 116²

*Lynch, Bk. of Iris, p. 105 (1906).

[N.B. Lynch's statement on p. 106 that Foster's yellow-flowered *Barnumae* had a linear beard is contrary to Foster's notes: "is a yellow form of *I. Barnumae*; beard thick, bright orange—much more diffuse than in Van specimens" (MS.).]

I. chrysantha, *Baker in Bot. Mag. t. 7784 (1901).

Lynch, Bk. of Iris, p. 152 (1906).

[N.B. The specimen (K) from which the plate was prepared and the description drawn up shows distinctly the broad diffuse *Oncocyclus* beard and I see no reason for separating the plant from *I. Barnumae* var. *urmiensis*.]

¹ Named after Mrs Barnum of the American Mission at Kharput, who sent rhizomes to Foster in 1886.

² A printer's error gave the colour of the flowers as crimson instead of primrose.

(?) *I. Cosniae*, Hort ex Garden, XLVII. p. 351 (1895).

[This is described as a Cushion Iris—a popular name for an *Oncocyclus*—with a fine large flower, standards clear yellow with dark purple markings at the base and falls of the same shade pencilled with purple. The plant was only known as flowering in Ware's garden.]

† Var. *Mariae*. See also Observations infra.

SYNONYMS.

- I. Mariae*, Barbey in OBZ. XL. p. 207 (1891)¹.
 • Gartenflora, 1893, p. 488, t. 1394 A.
 • Bull. Soc. Tosc. Ort. 1893, t. 7.
I. Helenae, Barbey, Herbor. Levant. p. 159 (1882).
 Boiss. Fl. Or. v. p. 132 (1884).

DISTRIBUTION. The desert region between Egypt and Palestine.

El Arischi, 1880, Barbey (K).

El Ajrah to Esh Showahin, 1882, Post (BM).

Wadi el Abiad, 1882, Post (K).

Diagnosis.

I. Barnumae *Oncocyclus*; *planta* magnitudine *I. ibericae* sed flores concolores aut purpurei aut flavi.

Description. The description is based on Foster's original specimens (MS.).

Rootstock, a small rhizome, of somewhat straggling growth.

Leaves, slender, linear, about 6 in. long, slightly glaucous, erect or but little falcate.

Stem, varying in length from 2 to 6 in., the longer stems bearing one reduced leaf.

Spathe valves, narrow, pointed, reaching above the tube, deeply flushed with purple at the tip and extreme edge, 1-flowered, 2 in. long.

*Pedice*l, short.

Ovary, cylindrical trigonous, nearly an inch long.

Tube, about $\frac{3}{4}$ inch.

Falls. The lanceolate blade is not separated by any marked constriction from the cuneate haft. The colour is a dark vinous red purple with darker veins. The large triangular beard consists of close set thin yellow hairs tipped with purple, it is flanked by a few scattered hairs on either side. $2\frac{1}{4}$ in. long, $1\frac{1}{4}$ broad.

Standards. The orbicular blade narrows suddenly to a short canaliculate haft. The edges of the connivent blades are reflexed outwards and the haft bears a few hairs on the inner side. The colour is red purple, somewhat lighter than that of the falls with more conspicuous darker veins. $3\frac{1}{4}$ in. long by $2\frac{3}{4}$ broad.

Styles, nearly horizontal, dotted with purple on a brownish yellow ground; under surface yellow.

Crests, triangular, much recurved, finely serrate, red purple with deeper veins.

Stigma, semicircular with serrate purple edge.

Filaments, short.

Anthers, longer than the filaments.

Pollen, yellow.

Capsule, ellipsoid, trigonal, tapering at either end.

Seeds, of the usual *Oncocyclus* type, dark brown, wrinkled, pyriform, with conspicuous pale aril.

Fragrance, very noticeable in a warm atmosphere.

Observations.

The original plants from which the description is taken were obtained in the hills about two hours' journey from Van. Others that Foster received from Urumiah in 1887 had a dark purple almost black beard, but I have no doubt that the colour of the hairs in an Iris beard is a very untrustworthy character. It has been known to vary from year to year in the same individuals.

Foster received specimens of the yellow-flowered form from Hoog in 1900 and his note says distinctly "a yellow Barnumae" (MS.). Of the specimens sent to him by Cochran from Urumiah, some produced yellow, and some purple, flowers. In view of this fact and also because there are purple- and yellow-flowered forms of many other species of Iris, I have little hesitation in reducing *I. urmiensis* to a mere variety of *I. Barnumae*.

Both forms are distinguished from all other *Oncocyclus* Irises except *I. atropurpurea* by their flowers of a clear bright colour, not conspicuously blotched or coarsely veined.

If the identity of the dark-bearded form of *I. Barnumae* from Urumiah with the type is admitted, I see no means of separating from them Barbey's *I. Mariae*. The signal patch is perhaps slightly more prominent but otherwise the plants seem identical.

¹ This is only a note changing his previous name of *I. Helenae* to *I. Mariae*.

I. MEDA

Stapf in Denkschr. Acad. Wien. L. p. 20, Bot. Ergeb. Polak. Exped. Pers. (1885).

Baker in *Bot. Mag. t. 7040 (1889).

Hdk. Irid. p. 28 (1892).

SYNONYMS.

I. Straussii, Leichtlin ex Micheli in Rev. Hort. 1899, p. 363 ex parte.

[N.B. Some confusion is involved here because the plants are said to have been found near Sultanabad by Strauss and yet the description of them as having two flowers does not agree with Strauss' herbarium specimens. It is rather that of *I. mellita* Janka (p. 149) and moreover the plants in commerce under the name of *I. Straussii* were really *I. mellita* (cf. The Garden, 1899, II. p. 149, Gard. Chron. 1909, I. p. 391).]

I. fibrosa, Freyn. Bull. Herb. Boiss. IV. p. 182 (1896).

[N.B. The type was collected by Strauss near Sultanabad.]

DISTRIBUTION. Central Persia in the provinces of Hamadan and Irak-Ajemi.

Hamadan; Mt Karaghan (Kabuterchan), 1882, Pichler (V).

Irak-Ajemi; Sultanabad, 1890, (K).

1892, Strauss (B).

Diagnosis.

I. meda Oncocyclus; *planta* magnitudine *I. acutilobae* sed *segmenta* magis obtusa, *venis* diffusis.

Description. This description is taken partly from the original account, partly from the Botanical Magazine (l.c.) and partly from Foster's MS. notes.

Rootstock, a short-creeping rhizome, weaker than that of *I. pumila*.

Leaves, about 4 to a tuft, linear, glaucescent, 4—6 ins. long at flowering time.

Stem, one-headed, about as long as the leaves.

Spathe, one-flowered; valves lanceolate, herbaceous, 2—2½ in. long.

*Pedice*l, scarcely any.

Ovary, under 1 in. long, rounded trigonal.

Tube, green cylindrical, as long as the ovary.

Falls, oblong-cuneate, reflexing from half-way down, with a dark signal patch and a dense yellow beard. The colour of the segments is either lilac purple, or greenish yellow with thick dark purple veins.

Standards, longer than the falls, oblong-unguiculate, erect; the colour is either lilac purple slightly paler than the falls or greenish yellow with brown veins.

Styles, broad and convex on the back.

Crests, small, deltoid crenate.

Stigma, entire.

Filaments,

Anthers, longer than the filament.

Pollen,

Capsule, of the Oncocyclus character, 2½ in. long, pointed at either end.

Seeds, globular, light reddish brown, with conspicuous aril.

Observations.

This Iris was classed by Baker among the Pogoniris and said to be allied to *I. chamaeciris* but the specimens quoted and the details which Baker himself gives (Bot. Mag., l.c.) leave no doubt that *I. meda* belongs to the Oncocyclus group. This supposition is confirmed by a note in Foster's MS. that the seeds of the plants, from which the Botanical Magazine figure was prepared, were large and globular with a conspicuous aril. The figure portrayed the yellow-flowered variety, which is mentioned by Stapf in his original description, although his type had purple flowers.

In 1888 Foster received from the plains between Tel Erman and Armonde to the south of Mardin in Mesopotamia an Iris very closely allied to *I. meda*, if not identical with it (MS.). It grew there abundantly in a somewhat light red loam and its rhizome was markedly stoloniferous. It only differed from *I. meda* in having a whitish and not a distinctly yellow beard and slightly broader falls.

For cultivation see the remarks on the Oncocyclus section, p. 108.

I. GATESII

Foster in Lecture on Irises, May 14th, 1889, ex Journ. Hort. Soc. Lond. XI. (1890), p. 144

*Gard. Chron. 1890, II. p. 17.

*Micheli in Bull. Soc. Tosc. Ort. Ser. II. Vol. VII. 1892, p. 296, t. 10.

Baker in Hdk. Irid. p. 18, 1892.

*The Garden, XLIII. 1893, p. 132.

*The Garden, July 31st, 1897, showing a number of plants in bloom at Haarlem.

*Bot. Mag. 7867 (1902).

This magnificent Iris was named by Foster after the Rev. T. G. Gates of the American Mission at Mardin, through whose assistance a stock of it was procured by Sintenis for Max Leichtlin in 1888.

DISTRIBUTION. The neighbourhood of Mardin in Asia Minor.

No herbarium specimens of wild plant are known, except perhaps Mardin, 1888, Sintenis (K).

Diagnosis. See the remarks on p. 107.

Description.

Rootstock, stout, short-creeping.

Leaves, linear-ensiform, slightly glaucous, 9—12 in. long, $\frac{1}{2}$ — $\frac{3}{4}$ in. wide.

Stem, about a foot or eighteen inches long with one or more clasping leaves.

Spathe valves, 1-flowered, 4 ins. or more in length, green, striated, pointed, rounded, somewhat inflated, reaching above the tube.

Pedicel, short.

Ovary, $1\frac{1}{2}$ in. long, rounded trigonal with broad groove on each side.

Tube, $1\frac{1}{2}$ —2 in. long, gradually expanding above, green with purple spots and a broad band of purple in continuation of the standards.

Falls. The haft, which is nearly an inch broad and somewhat greenish on the under side with veins and dots showing through, expands gradually into the ovate blade, which is as much as 4 or 5 inches wide. The ground colour is a greyish or greenish white, marked with very fine veins, formed of rows of small purple spots, and finely dotted with purple in the median portion. The greater part of the haft is covered with crowded hairs, irregularly scattered in groups, of a grey, greenish or brownish colour, flecked with purple; on the blade these hairs divide and embrace a small purplish signal.

Standards, orbicular, about 4—5 ins. across, somewhat suddenly narrowed to the purplish claw. The colouring is similar to that of the falls, except that the purplish veins become more pronounced in the median region towards the haft.

Styles, much arched and sharply keeled, thickly spotted with purple on a creamy white ground.

Crests, subquadrate, with finely serrate edge, spotted and streaked purple on cream.

Stigma, semi-circular, entire.

Filaments, creamy white, often tinged with red.

Anthers, creamy white.

Pollen, cream.

Capsule, very large, as much as 5 in. in length.

Seeds, pyriform, with conspicuous white aril.

Observations.

The flowers of this species are larger than those of any other Iris, except perhaps some of the Kaempferi hybrids. The colour is not handsome nor so beautiful as that of *I. Lortetii*. At a distance of a few feet the effect is a pale pearly grey, and the majestic size of the bloom is its most striking feature. A number of magnificent flowers of this Iris that I once saw in a neighbour's garden was a sight never to be forgotten.

That this Iris will flower freely under certain conditions is proved by a photograph reproduced in The Garden for July 31st, 1897, p. 83, representing a bed bearing hundreds of flower spikes in Van Tubergen's nursery at Haarlem.

For cultivation see the introduction to the *Oncocyclus* section.

† *I. LORTETII*

(See PLATE XXVII)

Barbey in Boiss. Fl. Or. v. p. 131 (1881).

Herbor. Levant. t. 7 (1882).

Bot. Mag. t. 7251 (1892).

*Gard. Chron. 1892, II. p. 152, fig. 27.

*Garden, Feb. 18, 1893, t. 897.

*Revue Hort. 1902, p. 404.

*Revue Hort. Belge, 1906, p. 173.

DISTRIBUTION. It has only been found on the southern slopes of Lebanon at an altitude of 2000 ft., where it grows among dry bushy tracts of *Quercus coccifera*.

N. Galilee; Safed (Hunin), 1897, Bornmuller (B).

Diagnosis. See the remarks on p. 107.

[†] Named after its discoverer Dr Lortet of Lyons.





Description.

Rootstock, stout, short-creeping.

Leaves, ensiform, 6—9 in. long, $\frac{3}{4}$ in. broad.

Stem, about a foot long, bearing two reduced leaves.

Spathe valves, 5 in. long, green or slightly scarious in upper part, slightly keeled.

*Pedice*l, practically none.

Ovary, cylindrical, $1\frac{1}{4}$ in. long, gradually narrowing to the tube with no definite separation.

Tube, $1\frac{1}{2}$ in. much rounded trigonal, green, becoming purple-spotted in the upper half.

Falls, much reflexed; the creamy ground is covered with minute crimson dots, sparsely scattered near the margin but becoming concentrated into a dark crimson patch or signal. The beard is scanty, of large scattered brown hairs, becoming short and velvety just before the signal.

Standards, orbicular, 3—4 in. in diameter, white with very thin reddish-violet veins, and dotted with reddish-brown spots on the keel and haft but with no hairs.

Styles, much arched and keeled, deep crimson red.

Crests, subquadrate, with serrated edge, finely dotted crimson on cream.

Stigma, semi-circular, entire.

Filaments, shorter than the anthers, white.

Anthers, cream, very large and long.

Pollen, cream.

Capsule, ellipsoid, trigonal in section, dehiscing below the apex.

Seeds, pyriform, with conspicuous white aril.

Observations.

This is perhaps the most beautiful of all Irises. It has not so large a flower as that of *I. Gatesii* but the great wavy pale pinkish-violet standards and the closely crimson-dotted falls, which are sharply reflexed and clasp the stem, form a delightful colour scheme. Unfortunately it seems to be one of the most difficult to cultivate among the difficult members of its class.

For suggestions as to its culture, see the introduction to the Oncocyclus section.

† *I. BISMARCKIANA*¹

*Dammann ex Wien. Gartenzeit. 1890, p. 352, fig. 72.

Baker, Hdk. Irid. p. 18 (1892).

in Gard. Chron. 1893, I. p. 506.

*Bot. Mag. t. 7986 (1904).

*Bull. Soc. Tosc. Ort. 1893, t. 7.

*Gartenflora, 1893, p. 486, t. 1394 A.

SYNONYMS.

I. Sari nazarensis, Foster in Garden, 1893, p. 133.

I. Sari var. *lurida*, *Bot. Mag. t. 6960 (1887).

DISTRIBUTION. Northern Palestine.

Diagnosis. See the remarks on p. 107.

Description.

Rootstock, stout, of the usual Oncocyclus character and often sending out stolon-like growths.

Leaves, as in *I. susiana*.

Stem, stout, 12 or more inches high, sheathed in reduced leaves.

Spathes, $3\frac{1}{2}$ —4 in. long, not scarious, quite green or slightly flushed with purple.

*Pedice*l, very short.

Ovary, oblong, rounded trigonal with a groove on either face.

Tube, equal in length to the ovary, rather more than 1 in. long, green with dotted dull red-purple stripes.

Falls. The broad ovate blade is not separated by any constriction from the broad wedge-shaped haft, which bears a diffuse beard of black-purple hairs on a pale yellowish ground. Beyond the extremity of the beard there is a velvety triangular black signal spot. The rest of the surface is covered with small black-purple spots on a creamy-yellow ground. The spots tend to coalesce into veins at the edge.

Standards. Orbicular, with a short haft. The colouring is composed of delicate bluish veins on a creamy-white ground. A few hairs are usually to be found along the inner side of the haft.

Styles, pale yellow, finely dotted with dark purple.

Crests, low, recurved with serrate edge.

Stigma, entire.

Filaments, short, cream.

¹ According to a letter from Messrs Dammann to Baker, dated April 1893 (K), the name was given but not published by Dr Regel of St Petersburg.

Anthers, much longer, cream.

Pollen, cream.

Capsule, a long ellipse, trigonal, dehiscing below the apex.

Seeds, globose or pyriform, dark reddish brown with a conspicuous white aril.

Observations.

This fine Iris comes nearest perhaps to *I. Lortetii* and only differs from it in being less delicately coloured. The veining is coarser and more pronounced and the groundwork is not so clear. It is one of the sturdiest members of the section and, if only the difficulties of cultivation could be overcome, it would be a valuable addition to any garden.

†*I. SUSIANA*

Linn. Spec. Plant. Ed. 1. p. 38 (1753) (non Zeller = *I. iberica*).

• Bot. Mag. t. 91 (1790).

• Savi, Fl. Ital. II. t. 74 (1822).

• Géel, Sert. Bot. Vol. 1. (1830).

• Flore des Serres, t. 1087-88 (1856).

• Revue Hort. 1859, p. 322.

• Eeden Album, t. 52 (1872-81).

Boiss. Fl. Or. v. p. 130 (1884).

Baker in J. L. S. XVI. p. 142 (1877).

Hdk. Irid. p. 17 (1892).

Journ. R. Hort. Soc. XXVIII. fig. 133 (1903-4).

SYNONYMS.

I. punctata, Moench. Meth. p. 527 (1794).

I. grandiflora, Salisb. Prod. p. 43 (1796).

Oncocyclus susianus, K. Koch in Linnaea XXI. p. 639 (1848).

Var. *livida*, Baker in J. L. S. XVI. l.c.

SYNONYMS.

I. livida, Tratt. Archiv. t. 176 (1814).

I. susiana, Red. Lil. t. 18 (1802).

Géel, Sert. Bot. (1830).

[This variety was described as being cultivated in France and is shown with flowers smaller, darker and less distinctly veined than those of the type.]

DISTRIBUTION. Unknown, it is impossible to say whether such specimens as Mosul 1841, Kotschy (K) are *I. susiana* or a closely allied species and, even if there were no uncertainty as to the identity of the specimens, it would be impossible to feel satisfied that the plants were not an importation in such a locality. Another such instance is

Diarbekir (Karadschi Dag), 1841, Kotschy (V).

[N.B. These specimens are possibly those described by Boissier in Fl. Or. v. 130 (1884) as *I. Heylandiana*]

Diagnosis. See the remarks on p. 107.

Description.

Rootstock, a stout compact rhizome, with a reddish skin. Cultivated plants do not produce stolons but these might arise in poor soil.

Leaves, 12 in. or more in length by $\frac{3}{4}$ —1 in. broad, of a distinctly yellowish green.

Stem, 12—15 in. long, sheathed in 2—3 reduced leaves.

Spathes, 1-flowered, valves $3\frac{1}{2}$ —4 in. long, green or slightly flushed with purple.

*Pedice*l, very short.

Ovary, much rounded trigonal, with a slight groove on each face, passing into the tube without any marked constriction, 1 in. long.

Tube, $1\frac{1}{2}$ in., green, striped and mottled with purple in the upper part.

Falls. The broad wedge-shaped haft expands gradually into the ovate blade and bears a very broad diffuse beard of brown-black hairs. Beyond this on the blade is a deep purple black velvety signal patch. The rest of the surface is of a dark grey colour, produced by numerous veins and dots of a dark black purple on a grey-white ground.

Standards. Orbicular with a short haft, which bears on its inner side a number of scattered black hairs. The colour resembles that of the falls but the lines and dots are not so thick and the whole effect is therefore lighter.

Styles, horizontal, sharply keeled, of a deep red-black colour.

Crests, broad and low, sharply reflexed.

Stigma, entire.

Filaments, creamy, about half as long as the anthers.

Anthers, creamy, very large, 1 in. long.

Pollen, creamy.

Capsule, 2—4 in. long, ellipsoid, tapering at either end, dehiscing below the apex.

Seeds, globose or pyriform, dark red-brown with a conspicuous creamy aril (cf. Plate XLVIII, Fig. 8).

Observations.

This Iris has been in cultivation in Europe for more than three centuries, for it was brought from Constantinople to Vienna in 1573, and a very fair picture of it was published by Clusius in 1601 (cf. Clusius, *Rar. Plant. Hist.*, pp. 217, 218 (1601)). It was moreover the first Iris to be described by Linnaeus in his list of the species.

I. susiana can hardly be described as beautiful, though its flowers are undoubtedly striking. Owing to the fact that this Iris has long been cultivated in the South of France, it has become more nearly acclimatised to the conditions of existence in English gardens than any other *Oncocyclus* species. Instances are not unknown where plants have spread into large clumps and flowered well year after year. The best conditions would probably include heavy limestone soil and certainly a warm and sunny position, where the soil was usually rather dry. These conditions might possibly be obtained in the requisite soil under a conifer, whose branches overhung the Irises and yet did not allow water to drip upon them to any extent nor shade them from the sun.

I. SOFARANA

*Foster in *Gard. Chron.* xxvi. p. 391, fig. 125 (1899).

*Siehe in *Gard. Chron.* 1904. II. pp. 162, 163.

*Lynch, *Bk of Iris*, p. 113 (1906).

Observations.

This is another of the many local colour forms that cannot be distinguished from *I. Bismarckiana* or *I. susiana* by anything but the colour. It was collected for Mr C. G. Van Tubergen of Haarlem at Ain Sofar on Lebanon. Siehe states that his variety *magnifica* was found in 1901 near Kartaba on Lebanon. (MS. on specimen (E).)

Description.

Falls. Thick blotchy veins of a very dark purple almost entirely obscure the creamy white ground. The diffuse beard is of long dark purple hairs.

Standards. Much lighter than the falls, with thin dark purple veins and spots on a nearly white ground.

Styles, dark purple, almost black.

† *I. ATROFUSCA*

Baker in *Gard. Chron.* 1893, I. p. 384. non **Bot. Mag.* t. 7379 (1894); see *Observations*.

**Gartenflora*, 1893, p. 486, t. 1394 A.

**Bull. Soc. Tosc. Ort.* 1893, t. 7.

SYNONYM.

**I. Haynei*, Mallett in *Gard. Chron.* xxxv. p. 266 (1904).

DISTRIBUTION. Palestine.

Diagnosis. See the remarks on p. 107.

Description.

I. atrofusca does not differ from *I. Bismarckiana* (see *Description*, p. 119) except in the colour of the following parts.

Spathes, yellowish green, not flushed with purple.

Falls. Very closely veined and dotted with red black so that the yellowish groundwork is nearly entirely obscured. The circular signal patch is velvety black and the diffuse beard consists of dingy yellow hairs tipped with dark brown on a greenish yellow ground.

Standards. Less thickly veined and dotted than the falls with the same red black colour on a grey ground. The haft bears a few scattered hairs.

Styles, closely and finely dotted with red purple on a yellowish ground.

Observations. See those on *I. atropurpurea*.

† *I. ATROPURPUREA*

Baker in Gard. Chron. 1889, i. 330.

*Gartenflora, XL. t. 1361 (1891), t. 1394 A (1893).

*Bull. Soc. Tosc. Ort. 1891, p. 144, t. 5, 1893, t. 7.

Var. *atrofusca*, *Baker in Bot. Mag. t. 7379 (1894), non Gard. Chron. 1893, i. p. 384.

SYNONYM.

? *I. Eggeri*, Hort.

DISTRIBUTION. Syria, probably East of the Jordan.

Diagnosis.

I. atropurpurea Oncocyclus; *I. Barnumae* affinis sed colore atropurpureo, macula intense lutea differt.

Description.

Rootstock, a compact rhizome.

Leaves, linear, falcate, slightly glaucous, about 6 in. long at flowering time.

Stem, one-headed, about 6—8 in. in height, bearing about the centre a clasping leaf-like bract.

Spathe valves, lanceolate, green, 3—4 in. long, rising far above the top of the tube, 1-flowered.

*Pedice*l, none.

Ovary, light green, rounded trigonal, $\frac{3}{4}$ —1 in. long.

Tube, $1\frac{1}{4}$ in. long, green with dark stripes in line with the standards.

Falls. There is no constriction between the broad oblong haft and the slightly more oval blade, but the haft is suddenly constricted at its attachment to the tube.

In colour the haft is veined with thick red purple veins which merge into the dark purple ground colour, while the blade is almost black with a rectangular greenish yellow signal patch, in front of which there is a semicircular velvety quite black patch. The diffuse beard consists of thick, scattered yellowish hairs tipped with purplish black. 2 in. by $1\frac{1}{2}$ in.

Standards. Orbicular, with canaliculate unbearded haft, of a dark reddish purple with inconspicuous black veins, 3 in. by 2 in., but bearing no hairs.

Styles, much arched laterally, keeled, mottled with dark reddish brown.

Crests, quadrate, dark purple, edges finely serrate.

Stigma, mottled with reddish brown, conspicuously notched.

Filaments, yellow.

Anthers, twice as long as the filaments, white.

Pollen,

Capsule,

Seeds,

Observations.

It will be convenient to discuss several other names together with that of *I. atropurpurea*, for there has arisen an unfortunate confusion in the nomenclature.

If the view is accepted, which was put forward in the introduction to this section (p. 107), that several of these supposed species are really only differently coloured local races of the same species, it will be easy to understand how confusion may have arisen, seeing that colour is the only distinguishing feature and that this fades nearly entirely away after a few months or years in a herbarium.

The question is further complicated by the fact that these plants were most of them introduced from Palestine and Syria by Messrs Dammann of Naples, whose assistants seem to have been in the habit of setting up for themselves and then importing plants from the same neighbourhoods. In this way confusions arose, which were unwittingly perpetuated by the Kew authorities to whom specimens were sent for determination and to be named. (The evidence is in Herb. Kew.)

As far as I have been able to unravel the tangle, the truth of the matter seems to be as follows.

In 1889 there were sent to Kew specimens of an Iris which Messrs Dammann had obtained from Syria in 1888. These were named by Baker *I. atropurpurea* (K) in Gard. Chron. 1889, i. p. 330. See also *Gartenflora, 1891, t. 1361. This Iris, which has somewhat small and narrow and often falcate leaves, is distinguished by its undotted flowers of a uniform black colour with a beard of dark purple-black hairs, between which the yellow ground is apparent.

In 1893 Messrs Herb and Wulle of Naples sent to Kew plants, which Baker described as *I. atrofusca* in Gard. Chron. 1893, i. p. 384.

In the same year the same firm supplied to Gartenflora and to the Bull. Soc. Tosc. Ort. a double coloured plate containing an *I. atrofusca* Baker. There is also a photograph of the whole plant at p. 487 in that volume of Gartenflora.

In Baker's original specimens enough colour still fortunately remains to show that the standards are coarsely veined and dotted with small purple blotchy spots. This fact and the above-mentioned

figures and descriptions leave no doubt that the plant in question here is that which has been in cultivation for some years as *I. Haynei*.

Whether the name is really applicable to this plant cannot be determined, for all we know of *I. Haynei* is that two specimens were collected by Hayne on Mt Gilboa in 1872 (K), and that the colour was originally "lilac-purple" (Baker, Gard. Chron. 1876, II. p. 710, Hdk. Irid. p. 19 (1892)). It is unfortunately no longer possible to see from the specimens (K) whether the flowers were dotted with purple or not.

It should be noticed that in his article in *Gartenflora*, 1893, p. 486, Wulle mentions the existence of a poor dull-coloured form of *I. atropurpurea*, which some supposed to be Baker's *I. atrofusca*, and points out that the plants which he had sent to Baker were much finer and larger.

In 1894 Messrs Dammann sent to Kew the plants which formed the subject of Bot. Mag. t. 7379. These are doubtless the poor form of *I. atropurpurea*, mentioned by Wulle. Baker recognised their affinity to that species and accordingly stated that he had come to consider *I. atrofusca* as a mere variety of *I. atropurpurea*, not apparently realising that the plants that he had originally received from Herb and Wulle and described as *I. atrofusca* were not the same as the later consignment from Messrs Dammann.

The result of this somewhat intricate investigation is that we must attach the name of *I. atrofusca* to the plant well known in gardens now as *I. Haynei*, until we can ascertain whether this is really the Iris that grows on Mt Gilboa. If this proves to be the case, then Baker's name *I. atrofusca* of the Gard. Chron. becomes a synonym of *I. Haynei* and his *I. atrofusca* from the Bot. Mag. becomes recognised as a dull brownish-black variety of *I. atropurpurea*.

I. atropurpurea must apparently be fairly closely allied to *I. Barnumae* from which it differs chiefly in the colour and in particular in the yellow patch that relieves in the intense black of the falls.

I. MACULATA

Baker in Gard. Chron. 1876, II. p. 517.

Hdk. Irid. p. 10 (1892).

Boiss. Fl. Or. v. 125 (1884).

Observations.

Baker's description of this supposed species was based on a specimen collected by Aucher-Eloy in Mesopotamia. It was placed among the Apogon Irises and was said to resemble *I. caucasica* in its habit of growth.

This is most probably Aucher-Eloy's No. 2136 (K), which is undoubtedly an *Oncocyclus* Iris. The sheathing leaves on the stem certainly give it a superficial resemblance to a Juno Iris, and the dark signal patch was probably the feature in reference to which Baker gave it the name of *I. maculata*. The colour has now entirely faded away, and it is impossible to say more than that it is an *Oncocyclus* Iris of the group of tall closely allied forms or subspecies found in Syria and Mesopotamia.

I. DEMAWENDICA

I. demawendica was the name given to an *Oncocyclus* Iris discovered in 1902 by Bornmüller on Mt Elburs in Northern Persia (K) (BM) (V) (B). No description has been published and the dried specimens do not afford full details. It is a dwarf plant of the usual *Oncocyclus* character, with narrow, almost linear leaves that are only very slightly falcate, about 6 to 8 inches long. The stem of some six inches in length bears a reduced leaf and a single flower. The spathes are narrow, pointed, 2—2½ in. long, and the tube and ovary are approximately equal in length, about ¾ in. long. The falls have a dark diffuse beard and are apparently closely veined and dotted and of a deep violet-purple colour. The standards are paler and it is not impossible that the plant is merely a form of *I. iberica*.

THE REGELIA SECTION

This group of Irises was named in honour of Dr Regel of St Petersburg, who in the latter part of the nineteenth century did so much to introduce its members and other Asiatic species into cultivation in Europe.

In most of their characteristics, the members of this group closely resemble the *Oncocyclus* species, e.g. in the rhizomes (cf. Plate XLVII) and seeds (cf. Plate XLVIII, Fig. 8). They differ, however, in having two, or even three, flowers in the spathe instead of the single flower, which is all that the *Oncocyclus* species produce. Their beards, also, are linear and not widely scattered as is the case with the majority of the *Oncocyclus* Irises. The spathes also are more or less keeled and not rounded.

Another difference is horticultural rather than botanical and lies in the greater ease and certainty with which the Regelia Irises lend themselves to cultivation as contrasted with the *Oncocyclus* species.

They like a warm, well-drained position and a period of rest in summer. If the climate is such that this latter requirement is not obtainable in the natural course of events, it must be obtained artificially, either by lifting the plants in July and storing them in sand in a warm and dry position until the planting season arrives about the first week of October, or by covering the plants after flowering with a glass roof, which will throw off all moisture. This latter method is, of course, only successful where the soil is naturally well drained and where the subsoil becomes quite dry in the latter part of the summer. In Holland, the lifting method is invariably practised because in the bulb gardens there water is always to be found a short distance below the surface and is therefore always within reach of the root fibres. The plants would accordingly continue to grow even when protected by glass from overhead moisture.

The soil for these Irises should be a fairly strong loam, with the surface so arranged that water cannot lie stagnant and rot the rhizomes. Fresh farmyard manure should not be used, though occasional light dressings of a complete artificial manure tend to promote stronger growth in the plants.

The members of the section may be separated as follows:

- | | | |
|----|---|---------------------------------|
| | { Rhizome comparatively compact. | 1. |
| | { Rhizome wide-spreading by means of slender stolons; segments waved. | <i>I. stolonifera</i> (p. 125). |
| 1. | { Leaves ensiform. | 2. |
| | { Leaves linear, very narrow. | <i>I. falcifolia</i> (p. 127). |
| 2. | { Blade of falls narrowing suddenly to an oblong haft. | <i>I. Korolkowi</i> (p. 124). |
| | { Blade of falls tapering to a point above and narrowing gradually into the haft. | <i>I. darvasica</i> (p. 126). |

† *I. KOROLKOWI*¹

(PLATE XXVIII)

Regel, Enum. Pl. nov. Turkest. in Act. Hort. Petr. II. p. 432 (32) (1873)

•Gartenflora, XXII. p. 225, t. 766 (1873).

t. 1358 (1891).

Baker in J. L. S. XVI. p. 145 (1877).

in •Bot. Mag. t. 7025 (1888).

Hdk. Irid. p. 21 (1892).

•Foster in Gard. Chron. 1888, II. p. 36, fig. 3.

•Lynch, Book of Iris, p. 117 (1906).

DISTRIBUTION. Turkestan.

[N.B. In dealing with herbarium material, it is extremely difficult, unless the actual segments of the flowers are pressed and laid out separately, to differentiate the various members of this section. I am therefore unable to say with certainty that I have seen any herbarium specimens of *I. Korolkowi*.]

Diagnosis.

I. Korolkowi Regelia; *rhizoma* satis compactum; *folia* ensiformia, glauca, cauli simplici subaequalia; *spathae* herbaceae, apice tantum membranaceae, 2—3 florum; *segmenta* omnia venosa, *exteriorum* lamina in unguem oblongum contracta; *interiora* oblanceolata, obtusa.

Description.

Rootstock, a red-skinned rhizome with crowded growths, seldom inclined to produce stolons. The basal sheaths of the leaves and stem are membranous and surrounded by a few fibrous remains of older growths.

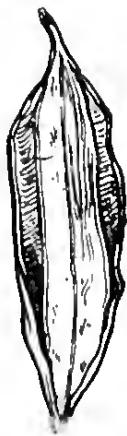


FIG. 13. Capsule of *I. Korolkowi*, showing how it dehisces below the apex.

Leaves, narrow, ensiform, of a pale grey glaucous green, often dark at the base.

Stem, about a foot in height, bearing 2—3 reduced leaves which wrap it closely, and a single head of 2—3 flowers.

Spathe valves, 2—3 in. long, keeled, acuminate, green more or less flushed with purple.

Pedicel, practically none.

Ovary, an inch long, trigonal.

Tube, an inch long, striped and mottled with dark purple.

Falls. Obovate cuneate, of a general pale olive-green colour, caused by olive-green or brown veins and a like coloured signal patch on creamy white ground, which has a greenish tinge. The haft narrows very suddenly at the base forming flanges which cover the base of the standards.

Standards, obovate unguiculate, with brownish veins on a whitish ground.

Styles, keeled, very dark reddish purple.

Crests, triangular, erect, not reflexed.

Stigma, entire.

¹ Named after General Korolkow, by whom plants were first sent from Turkestan to St Petersburg.





Filaments, purple.

Anthems, greenish edged with purple, usually much longer than the filament.

Pollen, greenish.

Capsule, pointed trigonal, walls thin with brown reticulations, dehisces below the apex like *I. Bloudowii* and the *Oncocyclus* species (Fig. 13, p. 124).

Seeds, large, dark reddish brown, almost black, the large nearly pure white aril being very conspicuous.

Observations.

The colouring of this fine Iris varies considerably and, as some forms have received distinctive names, it may be as well to quote here those which were given by Foster in the Gard. Chron. July 11, 1888, p. 36.

Var. *Leichtliniana*, Garden, Nov. 7, 1885. The standards and falls are nearly pure creamy-white, with fine unobtrusive veins, and the "signal" is of the deepest, almost black, purple.

Var. *venosa*, Gartenflora, t. 1358, sub nom. var. *venosa pulcherrima* (Foster in a MS. note wished to change this name to *nervosa*), is a variety with much more conspicuous veining.

Var. *violacea*. The olive green or brown of the type is replaced by violet or puce.

Var. *concolor*, *Bot. Mag. 7025 B, was received by Foster from Eastern Bokhara, and is rather smaller than the type, the spathe valves being broader and shorter, more keeled and flushed with purple. The segments are relatively broader and shorter, the venation being almost wholly obscured by a general violet or purple colour.

Of late years many seedlings of this species have been raised and endless forms have arisen, some of which are intermediate between the above-mentioned. It is impossible to name every variety, although all are so different from any other species, that it is difficult to mistake a specimen of *I. Korolkowi* for anything else.

When the new growths first pierce the ground in late autumn or winter, some are green and some very deeply flushed with purple. I have so far been unable to connect this character with any others in the flowers. It is obviously parallel to the purple colouration at the base of the leaves of many *Pogoniris*, of which no satisfactory explanation has yet been given.

For cultivation see the introduction to the section (p. 123).

† *I. STOLONIFERA*

(PLATE XXIX)

Maxim. in Bull. Acad. Pét. XXVI. p. 535 (1880).

Mél. Biol. X. p. 732 (1880).

Baker, Hdk. Irid. p. 29 (1892).

O. Fedtschenko in Journ. Russ. Bot. 1909, no. 5, p. 75.

SYNONYMS.

I. Leichtlini, Regel in Act. Hort. Petrop. VIII. p. 680 (1884).

*Garden, 1897, p. 222, t. 1136.

Foster in Gard. Chron. XXXII. p. 242 (1902).

*Bot. Mag. t. 7861 (1902).

Journ. Hort. Soc. XXVIII. fig. 132 (1903-4).

I. vaga, Foster, see Observations.

*Gartenflora, 1887, p. 204, t. 1244, no. 8 (Rootstock only).

DISTRIBUTION. Bokhara and Turkestan.

Bokhara. Taschbulak, 1883, Regel (V) (B).

Turkestan. Hissar, 1882, Regel (V).

Diagnosis.

I. stolonifera Regelia; *I. Korolkowi* affinis sed *rhizoma* valde stolonifera (see Plate XLVII, Fig. 2); *segmenta* omnia medio violacea, margine undata, cupreo-suffusa, *exteriora* cuneato-obovata, *interiora* copiose barbata.

Description.

Rootstock, a somewhat slender fleshy red-skinned rhizome, with a tendency to send out new stolon-like growths (see Plate XLVII, Fig. 2).

Leaves, ensiform, somewhat dark bluish green, purple at base when young, coarsely striated.

Stem, 1—2 ft., wholly concealed except at the summit by clasping leaves, bearing a single head of 1—3 flowers.

Spathe valves, green, navicular, sharply keeled, slightly scarious at the upper edge and flushed with purple, 2½ in. long.

Pedicel, very short.

Ovary, 1 in., rounded trigonal, with a groove on either face, bright pale green.

Tube, 1 in., funnel-shaped, green with a purplish tinge.

Falls. The obovate blade is not separated by any constriction from the broad haft, which is a yellowish-white with conspicuous diffuse orange-brown veins. The blade is of a fine blue purple with a waved edge suffused with bronze. The beard is bright yellow behind and sometimes tipped with brown in front, $2\frac{1}{2}$ —3 in. by $1-1\frac{1}{4}$ in.

Standards, obovate unguiculate, blue purple with fine darker veins in the median parts, bronzy brown at the edge from the confluence of brown veins. On the inner side there is a distinct linear beard for more than $\frac{1}{3}$ of the whole length, of yellowish hairs tipped with brown or orange. $2\frac{1}{2}$ in. by $1\frac{1}{4}$ in.

Styles, blue purple.

Crests, narrow triangular, bronze brown, with distinct veins.

Stigma, entire, semicircular, prominent.

Filaments, short.

Anthers, very large and at least twice as long as the filament.

Pollen, cream-coloured or slightly tinged with blue.

Capsule, with thin walls, 3 in. long, tapering at either end, sharply trigonal, dehiscing below the beaked apex.

Seeds, light brown, with conspicuous white aril.

Observations.

The nomenclature and synonymy of this *Iris* are somewhat confusing, partly owing to the fact that the species was first described from dried specimens alone and partly to the undoubted existence of several forms in the wild state.

The facts seem to be as follows. In 1869 Mme O. Fedtschenko discovered an *Iris* in the Zarefshan (Sarafschan) valley in the mountains of Turkestan which Maximowicz described as *I. stolonifera* in 1880 (v. supra). About 1883 Dr Regel received from Bokhara an *Iris* which he named *I. Leichtlini*, overlooking apparently the existence of Maximowicz's *I. stolonifera*, to which he makes no allusion. In 1884 Foster received some plants through Max Leichtlin from General Korolkow, which proved to be very wide-spreading in their growth. He therefore named them *I. vaga*. In the next year, 1885, he received another specimen from Gen. Korolkow, which, owing to its closer growth, he labelled *I. vaga* var. *compacta* (MS). In the Gardeners' Chronicle for 1888 (ii. p. 36), however, he acknowledged that his *I. vaga* was "only a very distinct variety of *I. Leichtlini*."

In 1908 seeds and rhizomes were collected in the original locality in Zarefshan by Goldbeck and Fedotoff (see Fedtsch. l.c. p. 75, n. 3). These flowered in Mme Fedtschenko's garden, near Moscow, in 1909, and she was able to compare them with specimens of *I. vaga*, which she had received from Foster, and as to the identity of which there was therefore no doubt. She came to the conclusion that *I. vaga* was merely a synonym of *I. stolonifera*.

But even if all the forms must be looked upon as belonging to the same species, it is useless to deny that the plant is variable in the growth of the rhizome, in the presence or absence of purple colouration at the base of the leaves, and in the colour of the flowers. These are always blue, edged or shot with brown, but the shade of colour may be either pale or dark, the veins may be heavy or faint, and, above all, the beard may be of bright yellow or bright blue or of an intermediate mixture. In my own garden I have observed that the same plants, which in one year had yellow beards, in the next had blue, and in another had beards of a dingy colour resulting from the juxtaposition of bluish and yellowish hairs. Max Leichtlin, to whom I appealed to know the colour of the beard of *I. Leichtlini*, replied that it was "of a nondescript colour," and contained yellow, white, and blue hairs. No explanation of this change has been put forward.

But even if this change in the colour of the beard points to the unreliability of this character, it may be useful to record that Maximowicz's *I. stolonifera* and Regel's *I. Leichtlini* had yellow beards, while Foster records (MS.) that the beards both on the falls and on the standards of his *I. vaga* consisted of hairs that were blue or bluish white above and white tipped yellow at the base. The stem was nearly two feet high. This form I still have in cultivation and I cannot separate it specifically from typical *I. stolonifera*.

For cultivation, see the introduction to the section (p. 123).

⁺*I. DARWASICA*

Regel in Act. Hort. Petrop. VIII. p. 679 (1884).

SYNONYMS.

*I. Suwarowi*¹, Regel in Act. Hort. Petrop. IX. p. 619 (1886).

Gartenflora, XXXV. p. 397 (1886).

*Bot. Mag. t. 7029 (1888).

I. lincata, *Foster, MS. ex Regel, Gartenflora, XXXVI. p. 201, t. 1244, nos. 1—7 (1887).

Foster in Gard. Chron. 1888, II. p. 36.

¹ Named after Suwarow, the Inspector of the Medical Service in Turkestan. Regel in Gartenflora, 1886, p. 397.





DISTRIBUTION. Bokhara.

Darwas; near R. Pandsch, 1883, A. Regel (K) (BM) (B) (V).
 Baldshuan, 1883, A. Regel (B)¹.
 Tian Pass, 1906, Roshewitz (B).
 No locality (Turkestan), 1889, Grombizewski (K).

Diagnosis.

I. darwasica Regelia; *I. Korolkowi* et *I. stoloniferae* affinis sed *rhizoma* compactum, *segmenta* omnia acuminata, *interiora* plerumque barbata.

Description.

Rootstock, a somewhat slender rhizome, resembling that of *I. Korolkowi*.

Leaves, linear, very glaucous, of a somewhat dark bluish green, about 12—15 in. long by $\frac{1}{2}$ in. wide, often flushed with purple at the base.

Stem, about 12 in. long, bearing 2—3 flowers and a narrow clasping leaf.

Spathe valves, 3—3 $\frac{1}{2}$ in. long, quite green or slightly flushed with purple, sharply keeled, very pointed, reaching above the top of the tube.

Pedicel, short, $\frac{1}{3}$ in.

Ovary, about 1 in. long, sharply trigonal, with slightly concave sides.

Tube, slightly over 1 in. long, rounded trigonal, green with faint purple stripes in the line of the standards.

Falls. The blade is linear lanceolate or oblong with a pointed extremity, the haft being cuneate, widening gradually to the blade. The groundwork is of a greenish brown colour, with conspicuous veins of brownish red or purple. The beard is of whitish hairs tipped with blue. 2 $\frac{1}{4}$ in. long by $\frac{1}{2}$ in. wide.

Standards. The pointed oblong blade narrows gradually to a canaliculate haft, which usually bears a line of hairs. This beard is, however, not always present, not even in all the standards of the same flower. The colouring is similar to that of the falls.

Styles, light yellowish green, faintly flushed with brown purple at the edges.

Crests, small, triangular.

Stigma, entire or very obscurely bilobed.

Filaments, short.

Anthers, much longer than the filaments, often more than twice as long.

Pollen, bluish.

Capsule, an ellipse pointed at either end and dehiscing below the top as in *I. Korolkowi*.

Seeds, globose or pyriform with conspicuous pale aril as in all *Regelia* Irises.

Observations.

This Iris is closely allied to *I. Korolkowi* and to *I. stolonifera*, but it is easily distinguished from them, at least in the living state, by the narrow, conspicuously pointed segments of the flowers. In the dry state, as herbarium specimens, it is almost impossible to separate these species unless a flower has been dissected and the segments fully displayed.

My supposition that *I. Suwarowi* is really synonymous with *I. darwasica* is confirmed by a note of Mme Fedtschenko in Journ. Russ. Bot. 1909, no. 5, p. 76, n. 1, to the effect that in the Herbarium of the St Petersburg Botanic Garden there is a specimen called *I. Suwarowi* by Regel from the locality from which he obtained his original specimen of *I. darwasica* (East Bokhara; Mt Ala-Kisrak in the Kulab district).

The cultivation of this Iris is the same as that of the other members of the section (see p. 123).

I. FALCIFOLIA

(FIG. 14, p. 128)

Bunge, Pl. Lehm. in Mém. Sav. Etr. Pétersb. VII. p. 505 (1847)

Baker in Gard. Chron. 1876, 1. p. 788.

in J. L. S. XVI. p. 147 (1877).

Hdk. Irid. p. 30 (1892).

Maxim. in B. A. P. XXVI. p. 506 (1880).

Boiss. Fl. Or. V. p. 133 (1884).

SYNONYMS.

I. filifolia, Bunge, l.c. p. 506, non Boissier.

[N.B. Specimens determined by Bunge from Lehmann's collection (K) (B) show that *I. filifolia* is only a small form of *I. falcifolia*.]

¹ These specimens were distributed from St Petersburg with the determination "*I. stolonifera* var. *stolonibus nullis*." They are, however, most probably *I. darwasica*, for the rhizome of this species is more compact than that of *I. stolonifera*, as Regel himself acknowledged, when he pointed out that *I. Suwarowi* differed from *I. stolonifera* "*rhizomate estolonifero*," Act. Hort. Pet. IX. p. 619 (1884).

I. longiscapa, Ledeb. Fl. Ross. IV. p. 93 (1853).

[N.B. Lebebour's original description makes no allusion to *I. falcifolia*. He mentions *I. tenuifolia* but this has obviously little in common with a plant characterised by a long slender stem. Maximowicz in B. A. P. XXVI. p. 506 (1880) says that the seeds bear a white aril ("hilo perforato albido")—a characteristic of the *Regelia* and *Oncocyclus* groups.]

DISTRIBUTION. From the deserts East of the Caspian to Afghanistan and Beluchistan.

Bokhara. Deserts between Bokhara and Kermine, 18—, Lehmann (K) (B).

Tschakir-ata, Nasarbai, Chudak, 18—, Lehmann, no. 161 (B).

Transcaspia. Kisil-Arwat, 1886, Kye (B).

Gjaurs (near Askabad), 1900, Sintenis (K) (V) (E).

Between Gjaurs and Anau, 1896, Brotherus (B).

Krasnowodsk (near Askabad), 1900, Sintenis (V).

Hodscha-Galsuar on the Amu-Darya, 1906, Roshewitz, no. 36 (B).

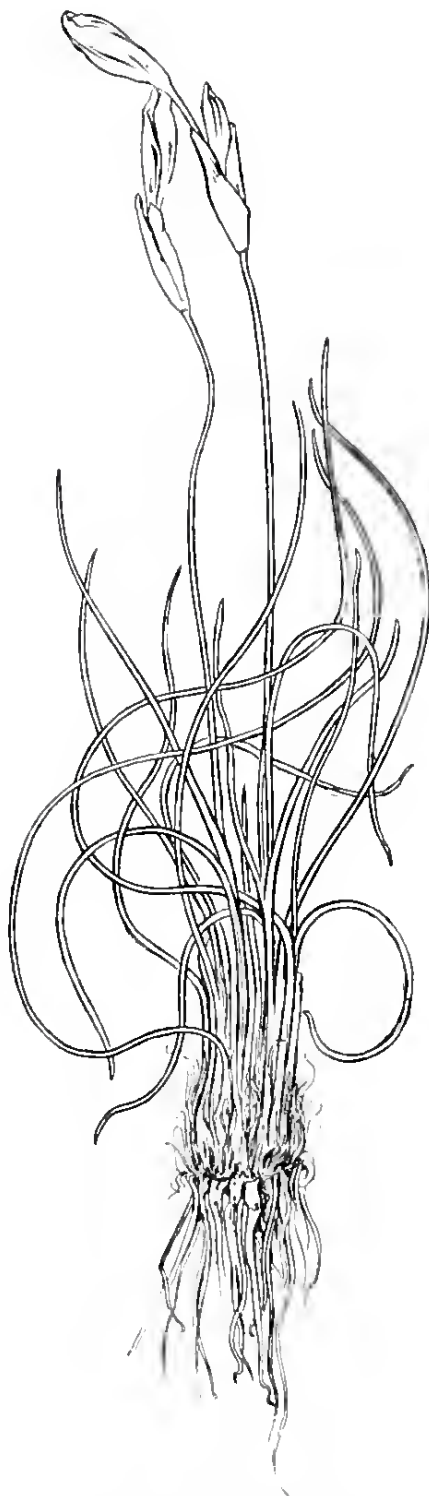
Afghanistan. No locality, 18—, Hb. Griffith, no. 5901 (K) (B).
no. 5914 (K).

No locality, 1885, no. 154, Aitchison (K).

Beluchistan. Pishin, 1888, Duthie, no. 8713 (K).

Mungochur, 1851, Stocks (K).

Yaru Kareg, 1890, Lace (K).



Diagnosis.

I. falcifolia Regelia; *rhizoma* compactum; *folia* anguste linearia, falcata, caule breviora; *caulis* gracilis; *spathae* 2—4 florum.

Description.

Rootstock, a small knarled rhizome of *Oncocyclus* or *Regelia* character, covered with the hair-like fibres of old leaves.

Leaves, falcate, narrow, linear, 4—8 in. long by $\frac{1}{4}$ in. broad.

Stem, slender, 6—10 in. long, bearing a single terminal head.

Spathes, 1—1 $\frac{1}{4}$ in. long, containing 2 to 3, or even 4, flowers, apparently green, narrow, acuminate.

Pedicel, none or very short.

Ovary,

Tube, 1 in.

Falls, oblong, lanceolate, bearded, 1 $\frac{1}{2}$ in. long.

Standards, 1 $\frac{1}{2}$ in., blade narrowly lanceolate with a canaliculate haft, which usually bears a few hairs.

Styles, 1 in. long, keeled.

Crests, narrow, pointed, triangular, $\frac{3}{8}$ in. long.

Stigma,

Filaments,

Anthers, slightly shorter than the filaments.

Pollen,

Capsule, of the *Regelia* character, dehiscing below the apex.

Seeds, oval or pyriform, with distinct whitish aril.

Observations.

The appearance of the rhizome of this *Iris* and of the many flowered spathes suggested that it is really a member of the *Regelia* group. This is confirmed by the capsule and by the seeds. The former is smaller than, but similar in shape to, those of the *Regelia* *Iris*es and the seeds have the characteristic white aril (cf. herbarium specimens and Maximowicz's description in B. A. P. l.c. "hilo perforato albido").

I. falcifolia does not appear ever to have been in cultivation.

FIG. 14. *I. falcifolia* drawn from a herbarium specimen; about two-thirds of the natural size.

THE PSEUDOREGELIA SECTION

In substituting the name *Pseudoregelia* for Baker's name *Pseudevansia*, I wish to draw attention to the far greater affinity of the plants contained in the group to the *Regelia* Irises than to the *Evansias*. Of Baker's seven species only four were said to show traces of the rudimentary crest, from which the hairs of the beard spring, and which was the character on which the group was based. Of these *I. Clarkei* was clearly so described by a mistake (see p. 29); *I. Alberti* is so utterly unlike the other members of the group and so obviously a *Pogoniris* that it is difficult to see how it ever came to be included here and, if *I. kumaonensis* and *I. Hookeriana* have any crest at all, it is so extremely rudimentary and obscure that it can hardly be looked upon as of sufficient importance to make it the basis of a group.

As a matter of fact, the examination of a number of flowers of the commonest *Pogoniris* will certainly provide examples of beards that "spring from a rudimentary crest", or which end in a distinct crest. The amount of crest will be found to vary in the different flowers on the same plant and even in the various segments of the same flower. Foster's opinion of the taxonomic value of this character is worth quoting in full. "As I have elsewhere (*Gard. Chron.* 1887, i. p. 611) urged, I cannot attach any importance to the ridge on the fall. Indeed, in general I may say that the prominence, or want of prominence, of a median ridge on the fall, and whether it is a mere even ridge, or toothed, lacinated, or cut up into a beard, is about the least trustworthy character that can be appealed to in determining the affinities, and so the classification, of Irises¹."

What then are the characters in which *I. goniocarpa*, *I. kumaonensis*, *I. Hookeriana* and *I. sikkimensis* agree and which separate them from all other Irises? They are found in the rhizome, in the capsules, in the seeds and in the shape and colour of the flowers.

First, they all possess a very compact rhizome, closely set with nipple-shaped growing points and presenting a gnarled appearance. In some ways there is a resemblance to the *Oncocyclus* and *Regelia* rhizomes, but the growth is much more compact and I have never yet seen any sign of a stolon.

Secondly, the capsules taper to a pointed apex, which remains undivided even when the seeds are ripe and the capsule dehisces below the top. This also is a character shared by the *Oncocyclus* and *Regelia* groups, but in the case of the *Pseudoregelia* species the capsule is much broader relatively to the length and never attains the size of those of the other groups.

Thirdly, the seeds show distinctly a creamy white aril, though here it is a mere flat ring and not a thick wax-like appendage often nearly as big as the seed proper.

Lastly, the flowers all agree in having conspicuously oblong and consequently blunt-ended standards and are curiously mottled with two shades of purple.

These characters, taken together, seem to define the group and certainly point to a far greater affinity to the *Regelias* than to the *Evansias* in which the capsules, seeds, rhizomes and flowers are entirely different.

The group is confined to Northern India and Western China and its members seem to be the collateral relatives on the south side of the great Hindukush ranges to the *Regelias* on the north.

The plants are somewhat difficult to cultivate because they come from regions where the year is divided into a dry and a rainy season. From March until October growth is rapid and moisture required and then the plants should lie dormant for six months in a comparatively dry soil. Since conditions in English gardens tend to be the very reverse of those that prevail in their native homes, the difficulties can be foreseen. Water must be supplied freely during the growing season and then during our winter it will be advisable to provide some sort of shelter in order to keep the plants comparatively dry. Failing this the root fibres are apt to rot and the plants thus weakened fail to flower properly in the following season.

The rule that Iris seeds that possess a conspicuous aril are slow to germinate seems to hold good here as it certainly does with the *Oncocyclus* and *Regelia* species. All the *Pseudoregelia* seeds that I have obtained and sown, even when they were homegrown and sown at once, have germinated very poorly, very irregularly and at long intervals. I even once went so far as to build a heap of snow three feet high over some of these seeds, but the reward was nil, although some of these identical seeds have now germinated after an interval of several years. I have not yet tried whether the solution of chloride of lime recommended for *Oncocyclus* seeds is equally effective with the *Pseudoregelias*, but it is certainly desirable to discover some means of hastening germination. Failing this, these Irises are never likely to become common in our gardens, since, owing to the character of the rhizomes, it is seldom that they lend themselves to multiplication by division.

¹ See Baker's definition of the *Pseudevansias* in *Hdk. Irid.* p. 2.

² Foster, *Bulbous Irises*, p. 85 (1892).

The members of the section may be separated as follows:

- | | | |
|----|--|---------------------------------|
| | { Stem not produced or extremely short; tube long. | <i>I. kumaonensis</i> (p. 130). |
| | { Stem produced. | 1. |
| 1. | { Spathes 1-flowered; plant very slender. | <i>I. goniocarpa</i> (p. 133). |
| | { Spathes 2-flowered; plant stouter. | 2. |
| 2. | { Tube short, under 1 in. long. | <i>I. Hookeriana</i> (p. 131). |
| | { Tube long, 1½—2 in. | <i>I. sikkimensis</i> (p. 134). |

† *I. KUMAONEENSIS*

(PLATE XXX)

Wallich Cat. no. 5052.

Baker in J. L. S. XVI. p. 144 (1877).

Hdk. Irid. p. 24 (1892).

SYNONYMS.

I. tigrina, Jacquemont MS. (K).

*I. Kingiana*¹, Foster in Gard. Chron. 1887, I. p. 611.

*Baker in Bot. Mag. t. 6957 (1887).

*I. Duthieu*², Foster in Gard. Chron. 1887, I. p. 611.

Baker, Hdk. Irid. p. 25 (1892).

DISTRIBUTION. The Garhwal and Kumaon districts of the Himalaya at an elevation of from 8—18,000 feet.

[N.B. Specimens (E) collected in May 1911 at an elevation of 12,000—13,000 ft. at A-tun-tsi in N.W. Yunnan seem to show that *I. kumaonensis* extends into Western China. It should be remembered that this is also the case with *I. nepalensis*.]

Kumaon, 182—, Wallich, no. 5052 (LS) (K) (BM) (C).

Phulaldaru, Tehri Garhwal, 1883, Duthie (K) (BM).

Kunawur, 1881, Brandis (K).

Bussahir (Sungri), 1881, Brandis (K).

Kumaon, 1846-49, Strachey, no. 756 (K).

Babé; Tari Pass, 1856, Schlagintweit, no. 9929 (BM) (B).

Kishtvar; Trilodnath to Kali Pass, 1856, Schlagintweit, no. 3834 (B).

Niti, Garhwal, 1846-49, Strachey and Winterbotham (K).

Kedarkauta, 18—, Jacquemont (K).

Ralum Valley, 1884, Duthie, no. 3426 (K).

Marati, 1886, Collett (K).

Dhumsala, 1874, Clarke, 23914 A (K).

Bashahr; Bagi-Sungri, 1890, Lace (E).

Kumaon, 1896, Cleghorn (E).

Tehri Garhwal; Kuthiamund, 1899, Duthie, no. 22,556 (B).

Garhwal; Badrinath, 1855, Schlagintweit, no. 10,003 (B).

Johar; Milum, 1855, Schlagintweit, no. 9677 (B).

Gnari Khorsum, S. of the Sutlej, 1855, Schlagintweit, nos. 7067, 7337 (B).

Uta Dhura Pass and across the Kinugar Pass, 1855, Schlagintweit, no. 7337 (B).

Lance's no. 275 (K) is an example of the rare caulescent form, from some unknown locality in the N.W. Himalaya. The stem is 2½ in. long.

Diagnosis.

I. kumaonensis Pseudoregelia; *rhizoma* compactum; *folia* sub anthesin brevissima, denique pedalia aut sesquipedalia, linearia, glaucescentia; *caulis* brevissimus; *spatharum* valvae carinatae, herbaceae; *tubus* 2—3 pollicaris; *segmenta* omnia maculata, truncata, emarginata, *exteriora* pilis albis aurantiaco-capitatis barbata.

Description.

Rootstock, a compact, gnarled rhizome, bearing a few fibrous remains of old leaves.

Leaves, very short, about 3—8 in. long at flowering time, but developing later to 18 in. by ½ in., linear, pale green, glaucous.

Stem, usually undeveloped, under 1 in. and only 2—3 in. long in the rare caulescent form.

Spathes, 1—2 flowered, valves keeled, pale green, acuminate, scarious only at the tip, loosely wrapping the base of the tube, but leaving the upper part exposed.

Pedicel, ½ in. or less.

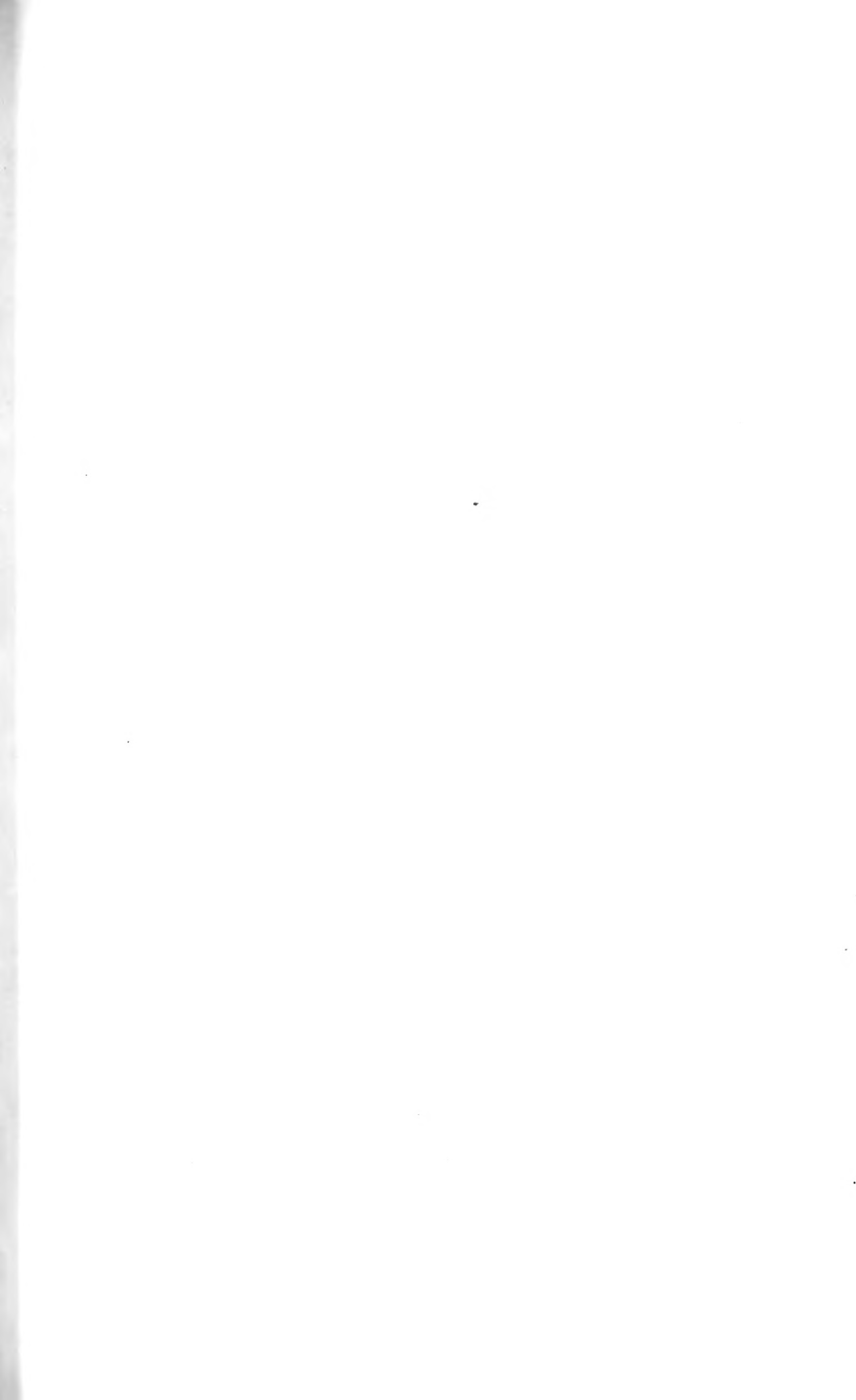
Ovary, short, almost circular or slightly hexagonal in section.

Tube, 2—3 in. long, striped with dark purple.

Falls. The cuneate haft is white marked with thick purplish broken veins and the oblong, ovate blade is of some shade of purple, veined and mottled, rather than blotched, with a darker shade near

¹ Named after Dr George King, a Director of the Calcutta Botanic Garden.

² Named after a Superintendent of the Saharanpur Botanic Garden.





the end of the beard, but becoming almost a uniform blue-purple at the extremity. The beard is of close-set, silky, white hairs, sometimes slightly tipped with orange or brownish-yellow.

Standards, shorter than the falls, the blade being oblong and distinctly and widely emarginate, usually of a paler shade of purple and more uniform in colour than the falls. The base, however, bears similar mottlings to those of the falls.

Styles, with a deep purple central ridge and paler sides, short.

Crests, triangular, with crenate edges, small.

Stigma, entire, with crenate edge.

Filaments, bluish.

Anthers, lavender.

Pollen, white.

Capsule, small, $\frac{3}{4}$ —1 in. long, almost circular in section, tapering to a point and dehiscing below the apex.

Seeds, red-brown, pyriform, with distinct but flat creamy aril.

Observations.

This Iris appears from herbarium specimens to be less abundant than *I. Hookeriana* in the valleys of the N.W. Himalaya and possibly to be confined to Kumaon and Garhwal. It was first collected apparently by Wallich and may be at once distinguished by the very short or entirely undeveloped stem and by the long perianth tube. The plants flower when the leaves are very short, but these eventually develop to about 18 in. in length. The capsule is short and spherical, distinctly rounder and shorter than the gradually tapering form of that of *I. Hookeriana*.

The nomenclature of these plants has been confused by the fact that Foster in 1887 described two forms under the names of *I. Kingiana* and *I. Duthiei* without any reference to the *I. kumaonensis* of Wallich, whose specimens are now at the Linnaean Society in London. His descriptions, as they were published, do not distinguish between *I. Kingiana* and *I. Duthiei*, but in his MSS. there is the following note. "*Duthiei* distinguished from *Kingiana* by beard, no sign of crest." There are sketches and also very full notes of the two plants, but they seem identical except in this single point, which is an unreliable character as is explained in the introductory notes on the *Pseudoregelia* section.

There does not seem to be any very great difficulty about the cultivation of this Iris in a rich well-drained soil and sunny position, where it will not be too wet in winter. Moisture must be provided in abundance during the growing season and care must be taken to prevent the destruction of the fleshy roots by wireworms which seem to be especially fond of them.

Increase by division of the rootstocks is slow and seeds are apt to lie dormant for years without germinating.

Herbarium specimens of *I. kumaonensis* differ greatly in appearance according to the time of year at which they are collected. For instance, a plant gathered in flower will have leaves that are only a few inches in length, not reaching even to the top of the flower, while, at the end of the season, when the capsule is ripe, the narrow leaves will have attained a length of a foot or eighteen inches, cf. Duthie no. 3426 and Clarke no. 23914 A (K). Even at this stage of the growth the stem is usually only an inch or two in length, although instances occur in which it develops to as much as four inches. Plate XXX illustrates the different appearance of the plant at different stages of its growth.

† *I. HOOKERIANA*¹

Foster in Gard. Chron. 1887, I. p. 611.

Baker, Hdk. Irid. p. 25 (1892).

in *Bot. Mag. t. 7276 (1893).

Hooker, f. Fl. Brit. Ind. vol. VI. p. 275 (1894).

SYNONYMS.

I. kumaonensis caulestensis, Baker, Hdk. Irid. p. 25 (1892).

I. gilgitensis, Baker, Hdk. Irid. p. 24 (1892).

DISTRIBUTION. From Western Tibet through Kashmir, where it is apparently very abundant to Chitral.

Western Tibet. No locality, 18—, Thomson (B) (V).

Totu-la, 1905, Meebold, no. 3222 (B).

Tibet and Ladakh, 1896, Cordeaux (BM).

Garhwal. No locality, 1884, Duthie (K).

18—, Royle (K).

Kashmir. Lahul, 1865, Jaeschke (K).

1882, Moravian Mission (Foster's type) (K).

1856, Schlagintweit, no. 4116 (B) (E).

Chamba, 1880, Ellis (K).

Little Tibet; Burzil Pass, 1848, Winterbotham (K).

¹ Named in honour of Sir Joseph D. Hooker.

Srinagar, 1907, Harrison (HortD).
 Kilan Merg, 1877, Aitchison, no. 107 (K).
 Pir Pinjal, 1876, Clarke (K).
 Said Valley, below Battal, 1892, Duthie 11543 (K).
 Durrawah Pass, 1847, Winterbotham (K).
 Gilgit; Kumu Kolat, 1885, Giles, no. 185 (K).
 Margan Pass, 1905, Meebold, no. 3223 (B).

And the following specimens obtained by Duthie's collectors in 1901:

Sind Valley, Battal, 21528, 25964, 25965 (K), 25951, 25966, 25957 (E).
 Charwan Pass, 25920 (K).
 Tragbal, 25866 (K).
 Tilail Valley, 25942 (K), 25907 (E).
 Kamri Pass, 25891, 25890 (K), 25892 (E), 25980, 25882 (B).
 Dras Valley, 25840 (B), 25918 (K), 25938, 25914 (E).
 Liddar Valley, 25810, 25973, 25977 (K), 25816, 25802, 25968, 25978 (E), 25981 (B).
 Sonamarg, Sind Valley, 25959 (K), 25982 (B).
 Liddarwat, 25811 (K).
 Gurais Valley, 25934, 25906 (K), 25932, 25886, 25888 (E), 25944 (B).
 Burzil Pass, 25945 (K).
 Astor Valley, 25946 (K), 25895, 25896 (E), 25869 (B).
 Brigola Pass, 25910 (K).

Chitral. Gujer, 1895, Harriss (K).

Diagnosis.

I. Hookeriana Pseudoregelia: *I. kumaonensis* haud dissimilis sed *folia* ensiformia, latiora; *caulis* productus, 4—6 pollicaris; *tubus* brevior, $\frac{1}{2}$ — $\frac{3}{4}$ pollicaris; *spathae* biflorae.

Description.

Rootstock, a somewhat slender rhizome, more compact than those of the Pogoniris group, and more largely covered with remnants of dead leaves.

Leaves, not more than 8 in. by $\frac{3}{8}$ in. at flowering time, but becoming later $\frac{3}{4}$ in. wide by a foot or more in length, of a yellowish green. The leaves die away entirely in the late autumn.

Stem, about five inches long, nearly entirely hidden by the short sheathing leaves.

Spathes, 2-flowered, valves green, somewhat inflated, and remaining green long after the flowers have faded, 3 in. long, sometimes slightly tinged with purple.

Peduncel, very short.

Ovary, small, $\frac{1}{8}$ in. or less in length, obscurely trigonal or nearly cylindrical.

Tube, $\frac{1}{2}$ — $\frac{3}{4}$ in. long, green with purple stripes.

Falls. The rounded, oblong, blue purple blade is blotched or rather mottled with a deeper shade, and narrows gradually to a wedge-shaped haft, which is marked with thick blue purple veins on a whitish ground. The beard is of fine white hairs, mostly club-shaped, and more or less conspicuously tipped with orange. Towards the front the hairs are slightly tinged with blue. 2—2 $\frac{1}{2}$ in. by $\frac{7}{8}$ in. (The colour is probably variable, and red-purple forms doubtless occur.)

Standards. The oblong blade is emarginate, of a bluer colour than the falls, and narrows suddenly to a canaliculate haft, which is marked with red-purple veins on a whitish ground. 2 in. by $\frac{3}{4}$ in.

Styles, blue, sharply keeled.

Crests, triangular, sharply recurved.

Stigma, entire, with a serrate edge.

Filaments, bluish, equal in length to the anthers.

Anthers, cream.

Pollen, cream.

Capsule, about 2 in. long, borne on a pedicel 1 in. long, narrowing gradually to a conspicuous beak, and opening below the apex, which remains united, with the remains of the tube and flower attached to it.

Seeds, pyriform, with reddish brown wrinkled coats and a yellowish white arillus, resembling those of the *Oncocyclus* section, but flatter and not so prominent.

Observations.

This species was described by Foster from specimens that flowered at Shelford. He had received them from Max Leichtlin, to whom they were sent from Lahul by Moravian missionaries (MS).

Specimens are common in herbarium collections, and there is little doubt that it was to this plant that Baker referred when he enumerated in his *Irideae* (p. 25), a caulescent form of *I. kumaonensis*. This may be inferred from his expression "perianth tube much shorter," for the few known specimens of *I. kumaonensis* in which a stem has developed all have the 2—3 in. tube of the type. In *I. Hookeriana* the tube does not exceed 1 in. in length, and is usually about $\frac{3}{4}$ in. long.

Baker's *I. gilgitensis* is apparently only a slender form of *I. Hookeriana*, for, although the fall blades in the type specimens at Kew are undoubtedly small, they are not spread out to their full extent. The view that Baker was only describing a weak example of *I. Hookeriana* is supported by

the fact that he identified Duthie's 1892 specimens from Battal in the Sind Valley of Kashmir (K) as his *I. gilgitensis*, while those gathered in 1901 in precisely the same locality by Duthie's collector are stronger and obviously *I. Hookeriana*. The climatic conditions of the seasons in which they were collected would be enough to account for the difference in vigour and size.

A few plants of this species, which I owe to the kindness of Mr A. G. Harrison of Srinagar, Kashmir, have been in cultivation in my garden for several years. They flower in May, but for some reason do not increase very rapidly. Seeds are very slow to germinate, even when quite fresh, and I find that Foster had also to wait six years before seedlings appeared (MS).

Cultivation is easy in light rich soil in a well-drained sunny position. The plants will do all the better if they are kept rather dry in winter, but they must be supplied with abundant moisture during the growing season.

I. GONIOCARPA

Baker in Gard. Chron. 1876, II. 710.

in J. L. S. XVI. p. 145 (1877).

Hdk. Irid. p. 24 (1892).

SYNONYM.

I. gracilis, Maxim. in B. A. P. XXVI. p. 527 (1880).

Mél. Biol. x. p. 720 (1880).

Baker, Hdk. Irid. p. 28 (1892).

DISTRIBUTION. From the Sikkim region of the Himalayas to Western and Central China, usually at high elevations up to 14,000 feet.

Himalaya Region. Sikkim, 18—, Hooker (K).

Chumbi Valley, 1904, Walsh, no. 19 (K).

Chumbi; Panka-la, 1878, Dungboo (BM).

Tibet. Yatung, 1897, Hobson (K).

Bhutan Frontier, 1882, Dr King's collector (K).

North; no locality, 1884, Przewalski (K).

Tongolo, 1891, Soulié (P).

1894, Soulié (B).

China. Szechuan; Tatsienlu, 1890, Pratt, no. 262 (BM) (K).

1893, Soulié (P).

1898, Mussot (P).

1904, Wilson, no. 4557 (K).

1908, Wilson, no. 3069 (K).

Kansu, 1873, Przewalski (K) (E) (V) (B).

1885, Potanin (E) (B).

Shensi; Tai-pei-shan, 1910, Veitch's collector, no. 411 (K).

Huan-tou-san, 1901, Giraldis, no. 7233 (B).

Diagnosis.

I. goniocarpa Pseudoregelia; *I. Hookeriana* valde similis sed minor et gracilior; *folia* anguste linearia; *spathae* uniflorae.

Description.

Rootstock, a slender compact rhizome, similar to that of the other members of the group.

Leaves, narrow, linear, springing from membranous sheaths, 6—10 in. by $\frac{1}{4}$ in.

Stem, 4—12 in., bearing a sheathing leaf attached near the base.

Spathes, 1-flowered, valves membranous.

*Pedice*l, very short.

Ovary, longer than the tube.

Tube, very short.

Falls, obovate cuneate, mottled with two shades of blue purple. The beard is of white hairs, tipped with yellow.

Standards, nearly as long as the falls, with oblong blades.

Styles,

Crests, triangular, narrow.

Observations.

This is the smallest member of the *Pseudoregelia* group, and has not yet apparently been introduced into cultivation. Baker's statement (Hdk. Irid. p. 24) that it has the habit of *I. nepalensis* is misleading, for the rootstocks of the two species are very unlike, *I. goniocarpa* has a short, and *I. nepalensis* a long, tube, the former linear leaves and the latter ensiform; in fact they only resemble one another in their slender appearance.

I can find no character by which to separate Maximowicz's *I. gracilis* from *I. goniocarpa*. The former was described from Przewalski's specimens from Kansu (K), and Maximowicz admits that he

had not seen any specimens of Baker's *I. goniocarpa*. He notes the resemblance of the descriptions of the two plants, but says that *I. gracilis* has not got leaves "half a dozen or more to a tuft," which was the expression used in Baker's original description. This, however, is misleading, for Baker's type in the Kew Herbarium has three fascicles, each of 2—3 leaves, coalescing to form one tuft. Maximowicz also lays stress on the fact that the leaves of *I. goniocarpa* were said by Baker to be longer than the stem and a foot or more in length. This is quite true, but it is equally true that one of Przewalski's specimens (K) exactly corresponds to this description, while in another the stem and leaves are both shorter.

I. goniocarpa appears to be distinct from *I. Hookeriana* in its slender foliage and stem, and in the small 1-flowered spathe. It is possible, however, that experience of the behaviour of the plants in cultivation would show that the smaller plant must be regarded merely as a form of the larger.

† *I. SIKKIMENSIS*

(PLATE XXXI)

SYNONYM.

I. kumaonensis caulescens, Dykes in Gard. Chron. XLIII. p. 396 (1908).

DISTRIBUTION. Probably from Sikkim, but the origin is somewhat uncertain.

Diagnosis.

I. sikkimensis Pseudoregelia; inter *I. kumaonensem* et *I. Hookerianam*; ab illa caule producto, foliis brevioribus et laxioribus, ab hac tubo duplo vel triplo longiore, segmentis interioribus oblique extensis differt.

Description.

Rootstock, a somewhat slender gnarled rhizome, with remains of old leaves splitting into fibres.

Leaves, 4 to 8 in. long at flowering time, eventually becoming 12—18 by $\frac{1}{2}$ — $\frac{3}{4}$, pale green, ensiform.

Stem, 4—6 in. long, bearing a terminal head of 2—3 flowers, and a sheathing leaf, attached near the base; the stem springs from a tuft of 4 reduced leaves.

Spathes, pale green, lanceolate, 2—3 in. long, the outer valve being keeled; both valves are scarious in the upper third, and along the edge at flowering time.

Pedicel, $\frac{1}{2}$ — $\frac{3}{4}$ in. long.

Ovary, trigonal, $\frac{3}{4}$ in. long, green, mottled and striped with faint purple.

Tube, $1\frac{1}{2}$ —2 in. long, trigonal, deep purple.

Falls. The obovate blade is of a dark purple lilac, mottled with a deeper shade, especially round the end of the beard; the wedge-shaped haft is blotched with purple on a whitish ground. The beard is of white club-shaped hairs, tipped with orange. $2\frac{1}{2}$ in. long by 1 in. or more broad.

Standards, sloping outwards at an angle of about 45°, with an oblong deeply and widely emarginate blade, narrowing suddenly to a canaliculate haft. The colour is a pale mauve lilac, faintly mottled at the base with a deeper shade. 2 in. by $\frac{3}{4}$ in.

Styles, narrow, keeled, 1 in. long, of a deep purplish blue in the centre, becoming much paler at the edges.

Crests, triangular, $\frac{1}{2}$ in. long, revolute.

Stigma, obscurely bilobed, with irregularly indented edge.

Filaments, pale violet, equal in length to the anthers.

Anthers, creamy white.

Pollen, cream.

Capsule,

Seeds,

Observations.

It is with some hesitation that I publish the account of this Iris, because, although after cultivating it for at least four years side by side with *I. kumaonensis* and *I. Hookeriana*, I have no doubt that it is distinct from both of these, I am not yet satisfied that it may not be merely a hybrid between the two. This however can hardly be possible, if, as I was led to understand, the plant was wild in Sikkim, for *I. Hookeriana* does not seem to extend as far east as that.

The history of the plant is somewhat obscure, for all that is certain is that it was very kindly sent to me by Messrs Barr and Sons, with the intimation that it came from an unknown locality in Sikkim. The rootstock might well have been either *I. kumaonensis* or *I. Hookeriana*, but the growth of the plant is quite different from either. The foliage is not nearly so broad as that of *I. Hookeriana*, nor does it grow after the flowering time to the same extent as that of *I. kumaonensis*. Moreover, the spathes are largely scarious, and the tube intermediate in length between those of the two above-mentioned species. In one unfortunate respect it differs markedly from either, namely in its obstinate refusal to set any seed, even though the flowers were carefully pollinated both with its own pollen



and with that of the two kindred species, which both set seed fairly freely, when cultivated under the same conditions.

Our knowledge of these dwarf Himalayan Irises is very limited and yet, since they are so abundant as to carpet the ground in some valleys, it ought not to be difficult to bring them more largely into cultivation. Unhappily at flowering time, when they would be most conspicuous, their growth is only partly developed, and that is consequently not a season at which the rootstocks would survive a long journey. To introduce them into Europe, it would be necessary to obtain either seeds at the end of the summer, or rootstocks in late autumn, when the leaves were withering.

THE POGONIRIS SECTION

This large section contains all those Irises whose outer segments bear a head of multicellular hairs but whose seeds have not the large white raised aril that is found on those of the *Oncocyclus* and *Regelia* Irises and to some extent on those of the *Pseudoregelia* section. The following groups may be conveniently distinguished:—

I. The *flavissima* group, which forms a transition from the *Regelia* section (p. 137).

Characters. Seeds with small but distinct aril; capsule dehisces below the apex; flowers twist spirally as they wither.

I. flavissima, I. Bloudovii, I. mandshurica.

II. The Dwarf European Pogoniris (p. 140).

Characters. Stem unbranched with a single head of 1—3 flowers.

I. pumila, I. pseudopumila, I. subbiflora, I. chamaeiris, I. mellita, I. Reichenbachii.

III. The Dwarf Pogoniris of Northern and Eastern Central Asia (p. 153).

Characters. Closely tufted growths, wrapped at the base in membranous sheaths and fibrous remains, thick root fibres, stem very short.

I. tigridia, I. Potanini.

IV. The larger European Pogoniris (p. 155).

Characters. Stem branched (weak specimens will occasionally be found in which the plant has not had sufficient energy to produce more than the terminal head. The lateral branches will however be produced if the same plant is grown in richer soil).

I. aphylla, I. variegata, I. germanica, I. pallida, I. Cengialti (I. amoena, I. flavescens, I. Kochii, I. lurida, I. neglecta, I. sambucina, I. squalens are all probably hybrids). *I. albicans (I. Madonna)* may be grouped here, though it is probably an Arabian plant (see p. 155).

V. Pogoniris of Syria and Asia Minor (p. 174).

Characters. Stem tall and much branched; flowering season a month later than that of *I. germanica*.

I. Junonia, I. Biliotti, I. trojana, I. mesopotamica, I. cypriana.

VI. Oriental Pogoniris (p. 178).

Characters. Spathes membranous rather than scarious, almost transparent.

I. scariosa, I. imbricata, I. Alberti.

VII. The Indian Pogoniris group (p. 182).

Characters. Spathes green, not scarious.

I. kashmiriana, I. Griffithii.

The individual members of the section may be separated as follows:—

- | | | |
|----|---|------------------------------|
| | { Stem unbranched. | 1. |
| | { Stem branched. | 13. |
| 1. | { Stem not produced or extremely short. | 2. |
| | { Stem produced. | 4. |
| 2. | { Rhizome not hidden in fibrous remains of old leaves. | <i>I. pumila</i> (p. 142). |
| | { Rhizome entirely hidden in fibrous remains of old leaves. | 3. |
| 3. | { Leaves tapering gradually to a sharp point. | <i>I. tigridia</i> (p. 153). |
| | { Leaves blunt. | <i>I. Potanini</i> (p. 154). |
| 4. | { Spathes with both valves sharply keeled. | 5. |
| | { Spathes either not keeled or with only one valve slightly keeled. | 7. |

5. { Spathes valves narrow lanceolate. 6.
- { Spathes valves comparatively short and broad. *I. Reichenbachii* (p. 151).
6. { Spathes valves persistently green, tube 2—3 in. long. *I. mellita* (p. 149).
- { Spathes valves membranous, almost transparent, scarious at the tip, tube 1—
1½ in. long. *I. scariosa* (p. 178).
7. { Rhizome more or less stoloniferous; seeds with minute aril; leaves thin, 8.
- { Rhizome more compact; seeds without any conspicuous aril; leaves thicker, 10.
8. { Spathes narrow, membranous, young shoots green, growths separated by slender stolons. *I. flavissima* (p. 137).
- { Spathes broader, growth more compact. 9.
9. { Spathes broad for their length, distinctly veined and flushed with reddish brown. *I. Bloudowii* (p. 138).
- { Spathes not noticeably broad, green. *I. mandshurica* (p. 140).
10. { Perianth-tube twice as long as the ovary; spathes short. *I. chamaeiris* (p. 148).
- { Perianth-tube three or more times as long as the ovary. 11.
11. { Spathes-valves wholly green. *I. Griffithii* (p. 184).
- { Spathes-valves not wholly green. 12.
12. { Spathes-valves linear, membranous. *I. pseudopumila* (p. 146).
- { Spathes-valves oval, green for the most part and only scarious in the upper half. *I. subbiflora* (p. 145).
13. { Stem branching at the centre or below, often at the very base; leaves dying entirely away before the winter. *I. aphylla* (p. 157).
- { Stem branching in the upper part. 14.
14. { Spathes-valves wholly scarious before the flowers expand. 15.
- { Spathes-valves not wholly scarious when the flowers expand. 16.
15. { Spathes-valves silvery white, plants 2 feet or more high. *I. pallida* (p. 166).
- { Spathes-valves pale brown scarious, plants much dwarfer. *I. Cengialti* (p. 168).
16. { Spathes-valves membranous, not scarious, much inflated. 17.
- { Spathes-valves green or partly scarious, not conspicuously inflated. 18.
17. { Outer segments (falls) strap-shaped, the haft bearing thick dark veins that end abruptly at a straight transverse line. *I. Alberti* (p. 181).
- { Outer segments (falls) more obovate, haft only slightly veined, plant dwarfer. *I. imbricata* (p. 179).
18. { Spathes-valves wholly green, not scarious, when the first flowers expand. 19.
- { Spathes-valves partly green and partly scarious, when the first flowers expand. 20.
19. { Spathes-valves short and broad, somewhat inflated, leaves thin and distinctly ribbed, plant not more than 18 in. high. *I. variegata* (p. 159).
- { Spathes-valves long and narrow, less inflated, leaves thicker and less distinctly ribbed, plant much sturdier and taller, 2—3 feet. *I. kashmiriana* (p. 182).
- [N.B. The remaining seven are extremely difficult and in some cases impossible to separate as herbarium specimens; some of them probably scarcely deserve specific rank (see p. 177).]
20. { Leaves short, glaucous, not growing to any extent until the winter is over, resembling those of *I. pallida*; spathes pale green, scarious in the upper part. *I. Junonia* (p. 174).
- { Leaves longer, beginning to grow in the autumn and attaining some length before the winter. 21.
21. { Spathes-valves narrow, acuminate. 22.
- { Spathes-valves broader, more navicular. 23.
22. { Spathes-valves almost wholly green, scarious only at the extreme edge and tip. *I. Biliotti* (p. 175).
- { Spathes-valves much flushed with purple, scarious in the upper third or half. *I. trojana* (p. 175).
23. { Spathes-valves much flushed with purple, scarious in the upper half. *I. germanica* (p. 162).
- { Spathes-valves not flushed with purple. 24.
24. { Flowers nearly sessile on the comparatively short, thick stem. *I. albicans* (*I. Madonna*) (p. 161).
- { Flowers borne on lateral branches; stem far overtopping the leaves. 25.
25. { Spathes-valves broad, membranous, only scarious in the upper third; leaves broad, tapering conspicuously above and below the middle. *I. mesopotamica* (p. 176).
- { Spathes-valves broad, membranous, the outer valve nearly wholly scarious; leaves comparatively narrow for so large a plant and with parallel sides, not noticeably wider in the middle. *I. cypriana* (p. 177).

I. *The flavissima group.*

I. flavissima and *I. Bloudovii* (with the possible addition of the imperfectly known *I. mandshurica*) form a small group of yellow-flowered Irises, which may be looked upon as the connecting link between the Pogoniris and Regelia Sections. They have hitherto been included among the Pogoniris¹, but they undoubtedly possess certain characteristics which show affinity to the Regelia species. These are the stoloniferous character of the rhizome, the small creamy white aril on the seeds, the capsule tapering at either end and dehiscing below the apex, which remains undivided, and the curious way in which the withering flower twists up spirally (cf. Fig. 15, p. 138).

†*I. FLAVISSIMA*

Pallas, Iter III. p. 715 (1773).

[Pallas there refers to *Gmelin, Fl. sib. i. p. 31, t. v. fig. 2 (1747).]

Jacq. Collect. IV. p. 98 (1790).

*Ic. Plant. Rar. II. t. 220 (1786-93).

*Tratt. Auswahl, no. 86 (1821).

Bess. Enum. Phan. Volh. p. 40 (1822).

Ledeb. Fl. Alt. IV. p. 332 (1833).

Baker in Gard. Chron. 1876, II. p. 710.

in J. L. S. XVI. p. 144 (1877).

Hdk. Irid. p. 29 (1892).

Maxim. in B. A. P. XXVI. p. 530 (1880).

SYNONYMS.

I. arenaria, *Waldst. und Kit. Pl. Rar. Hung. I. p. 57, t. 57 (1802).

*Red. Lil. t. 296 (1809).

*Lindley in Bot. Reg. t. 549 (1821).

*Géel, Sert. Bot. vol. I. (1830).

*Reichb. Icones, t. CCCXXX. fig. 757 (1847).

Baker in Gard. Chron. 1876, II. p. 710.

in J. L. S. XVI. p. 144 (1877).

Hdk. Irid. p. 29 (1892).

Maxim. in B. A. P. XXVI. p. 530 (1880).

Nyman, Consp. p. 701 (1882).

I. dahurica, Herbert ex Klatt in B. Z. XXX. p. 514 (1872).

I. nova, Ind. Hort. Bot. Pest. (1788).

DISTRIBUTION. Moravia, Hungary and North-Eastern Asia, from the Altai district to Mongolia.

Moravia. Nikolsburg, 1858, Makowsky (V).

Hungary. No locality, 18—, Kitaibel (V) (BM).

Pesth, 1815, Kitaibel (B).

18—, Kováts (V).

18—, Richter (V).

18—, Schiffer (E).

1830, Martins (E).

1876, Pornten (E).

18—, György (BM).

Stadtwaldchen, 18—, Perthini (K).

18—, Lang (B).

Isl. Csepel, 1870, Tauscher (K).

1871, Tauscher (V).

1872, Tauscher (B).

Rakos, 1878, Lajos (V).

1838, Lang (K).

Gran, 1866, Hb. Pittoni (V).

Nagy-Koros, 1895, Hollos (B).

Dubova, 1870, Janka (B).

Asia. [N.B. It is extremely difficult to separate herbarium specimens of *I. flavissima* from others of *I. Bloudovii* (see also p. 139). The latter would appear to have a stouter and more compact rhizome. The spathes too are broader, more navicular and more conspicuously veined, the short transverse veins between the main longitudinal lines being especially noticeable.]

Dahuria, "*I. lutea biflorae affinis*," 17—, Pallas (BM).

Lake Baikal, "*I. pumila*," 17—, Pallas (BM).

Jenisseisk; Steppes, 1873 (BM).

Irkutsk, 18—, Hb. Besser (K).

N. Mongolia; Changai, 1877, Potanin (K).

¹ Except by Spach, who formed a separate section *Psammiris* (= Sand Iris) for *I. arenaria* (a synonym of *I. flavissima*).

Diagnosis.

I. flavissima Pogoniris; *rhizoma* stoloniferum; *caulis* simplex, 2—3 florus: *spathae* angustae, virides; *flores* flavi, *barba* aurantiaca; *capsula* infra apicem dehiscet; *semina* arillo parvo albo.

Description.

Rootstock, a slender, much branched, wide-creeping rhizome.

Leaves, linear-ensiform, somewhat blunt, 3—4 in a tuft, 3—4 in. long by $\frac{1}{8}$ — $\frac{1}{4}$ in. broad, at flowering time, of a pale glaucous green.

Stem, 1—3 in. in length, bearing a terminal head of 2—3 flowers.

Spathae valves. The outer valve is acutely lanceolate and scarious in the upper part, $1-1\frac{3}{4}$ in. long; the inner is usually blunter.

Pedicel, $\frac{1}{4}$ in.

Ovary, $\frac{1}{3}$ in. long, rounded trigonal, with a ridge on either face, so that the section is almost hexagonal.

Tube, $\frac{1}{4}$ in., funnel shaped.

Buds, green, veined and tipped with bronze.

Falls. The oblong, bright yellow blade is slightly shorter than the wedge-shaped haft, which is faintly veined with brown purple. The beard is orange, the club-shaped hairs being tipped with brown along the haft.

Standards. Oblong unguiculate, the blade being yellow and the haft yellow, veined at the edge with brown purple.

Styles, short and narrow.

Crests, relatively large, triangular with acute tips.

Stigma, entire.

Filaments, colourless, about equal to the anthers.

Anthers, cream, with green-black edges.

Pollen, greenish.

Capsule, $1\frac{1}{4}$ in. long, tapering to the upper end, on which the tube and withered flower persist. The shape is that of the capsule of *I. Korolkowi*, namely, rounded trigonal. It dehisces below the apex (cf. Figs. 13, p. 124, and 15).

Seeds, brown, pyriform, with a long neck and a creamy white, flat aril.

Observations.

I can see no good reason for separating the Hungarian *I. arcuaria* from this Altai species. Other plants, among them *I. ruthenica* and apparently *I. humilis*, are found in Hungary and then not again until the Altai region is reached. The variation of *I. arcuaria* in cultivation according to the soil and conditions under which it is grown is sufficient to justify us in ignoring the supposed difference in size of the two plants, which is mentioned by

Waldstein and Kitaibel.

Even Maximowicz, whose practice it was to magnify minute differences into specific characters, admits (B. A. P. xxvi. p. 530 (1880)) that *I. flavissima* and *I. arcuaria* are only two forms of the same species, the former being slightly larger because it grows in moister, richer soil than the Hungarian plant.

This Iris shows a distinct affinity to the Regelia group, in the character of its stoloniferous rhizome, in the capsule, which tapers at either end and dehisces below the apex and in the seeds with their less developed, but noticeable, aril.

To do well, this Iris should be grown in a sunny, well-drained position in the rock-garden, the slender rhizomes being planted in a layer of very sandy soil about two inches deep, overlying soil which has been enriched with old leaf soil. When the rhizomes become too crowded, or show by their weak growth that the soil is becoming exhausted, they should be lifted and replanted soon after the flowers have withered. The plants require moisture when growth is active in spring.

Seeds are easily obtained by artificial pollination. They germinate fairly readily and the young plants grow rapidly, spreading in all directions, so that in the second year from the germination of the seed a plant will often produce as many as 6—8 flower-stems. Consequently the seedlings, when planted out, should be placed further apart than their small size would at first sight suggest.

†*I. Bloudowii*

Bunge in Ledeb. Fl. Alt. IV. p. 331 (1833).

*Ledebour, Icones Fl. ross. II. p. 5, t. 101 (1830).

*Regel, Gartenflora, 1880, p. 228, t. 1020, Fig. 2.

Baker in Gard. Chron. 1876, II. p. 710.

† Regel, Gartenfl. xxvii. p. 326, says that the plant was named in honour of Herr von Bloudow, a former President of the St Petersburg Academy of Science.



FIG. 15. Inflorescence of *I. flavissima*, showing two capsules and one withered flower that failed to set seed.

SYNONYMS.

- I. flavissima* Pall. var. *β umbrosa*, Bunge in Ledeb. Fl. Alt. 1. p. 59 (1829).
I. flavissima var. *Bloudowii*, Baker, Hdk. Irid. p. 29 (1892).

DISTRIBUTION. Southern Siberia, Turkestan and Northern China.

- Siberia.* Altai, 18—, Ledebour (K) (B) (V).
 1876, Waldburg Zeil (B).
 Nerchinsk, 1889-91, Karo (K) (BM) (E) (B).
 Jenisseisk; Minussinsk, 1900-01, Martjanow (K).
Turkestan. Chorgos, 1878, Regel (K) (BM) (B) (V).
 R. Dschirgala, 1879, Regel (V).
China. Thianshan, 1877, Potanin (K) (B) (V).
 Tarbagatai, 18—, Schrenk (BM).
 1840, Karelín and Kiriloff (V) (K) (BM) (B).
 Alatau, 18—, Schrenk (K).
 Songaria, 18—, Bunge (K).

Diagnosis.

I. Bloudowii Pogoniris; *I. flavissimae* affinis sed *planta* plerumque robustior; *rhizoma* magis compactum; *spatharum* *valvae* latiores, purpureo suffusae, nervis transversis conspicuis; *folia* primo nigropurpurea, denique omnino viridia.

Description (taken from notes and sketches in Foster's MSS. of a plant received from Dr Regel and from unflowered plants in my garden).

Rootstock, a somewhat slender compact rhizome, with crowded growths.

Leaves, when they first shoot, are dark green, tipped with blackish or purple brown, 4 or 5 to a tuft, 6—8 in. long by $\frac{1}{2}$ in. broad, yellowish green, striated at the base only.

Stem, 4—6 in., usually bearing leaves only at the base, 2—3-flowered.

Spathe valves, ventricose, keeled, pointed, flushed with dark reddish brown, with brown network of veins; the outer valve ends in a sharp curved beak.

Pedicels, $\frac{1}{2}$ — $\frac{3}{4}$ in. long, bright green.

Ovary, green with six purple stripes.

Tube, short, brownish.

Falls. Wedge-shaped with a rounded upper end. The bright yellow blade is held horizontally and the haft is veined with purple brown on a yellow ground. The yellow beard of relatively large hairs extends far over the blade beyond the short styles. 2 in. by 1 in.

[N.B. Ledebour's original description gives the length of the hairs of the beard as at least twice as long as those of *I. flavissima*.]

Standards, oblong unguiculate, much smaller than the falls, of an even brighter yellow than the falls.

Styles, narrow.

Crests, narrow, oblong or quadrate with dentate edge.

Stigma, entire, rounded.

Filaments, short.

Anthers, large.

Pollen,

Capsule, 2 in. long, trigonal, narrowing at either end and dehiscing below the top like those of the *Regelia* section.

Seeds, pyriform, brown, wrinkled with distinct whitish aril, only differing in size from those of *I. flavissima*.

Observations.

In the dried state, as herbarium specimens, it is extremely difficult, if not impossible, to separate satisfactorily *I. Bloudowii* from *I. flavissima* (see also p. 137). Ledebour's statement that in *I. Bloudowii* the pedicels of the two flowers are of equal length, while in *I. flavissima* that of the second flower is distinctly the longer is not borne out by the available specimens. Moreover, it is hardly ever possible to ascertain from dried material the exact shape of the segments and with regard to the shape of the spathe valves and to the prominence of the veining on them, the examination of a large number of specimens shows that there are many intermediate forms connecting the typically narrow and slightly veined spathes of *I. flavissima* with the broader, more navicular and more conspicuously veined valves of *I. Bloudowii*.

Another difficulty, with which we have to contend, is that it seems to be particularly difficult to cultivate *I. Bloudowii* successfully or at any rate to induce it to flower. The description given is taken from the account of a plant that once flowered with Foster, but my own experience has been that it has remained flowerless year after year though I have given it different soil and positions. However, the growth of the plant is so different from that of *I. flavissima* that it seems best to keep up the distinction between the two species. The leaves are larger and more distinctly striated and are remarkable for their deeply coloured tips while they are still quite short in early spring. The deep colour is a mark

of affinity to the Regelia group, for the young shoots of *I. Korolkowi* and *I. stolonifera* are also deeply coloured. The colour disappears, however, when the leaves have grown to 2 or 3 inches in length and does not persist at their base as in the case of the Regelia species.

I. MANDSHURICA

Maxim. in Bull. Acad. Pét. XXVI. p. 530 (1880).

Mél. Biol. X. p. 724 (1880).

DISTRIBUTION. Southern Manchuria, where it was found by Guldénstadt near the river Suifun.

South Ussuri district, 1897, Komarov (K).

North Corea; Talu, 1897, Komarov (BM).

North China, 1880, Webster (K).

Diagnosis.

I. mandshurica Pogoniris; inter *I. flavissimam* et *I. Bloudowii*; ab illa rhizomate magis compacto, foliis latoribus, ab hac spathis angustis viridibus differre videtur.

Description.

Rootstock, a slender, somewhat straggling rhizome with the bases of the growths wrapt in membranous sheaths.

Leaves, ensiform, green, 6—8 in. by $\frac{1}{2}$ in.

Stem, 3—6 in. long, sometimes bearing a lateral branch, set in a leaf-like bract (cf. Komarov's specimen (K) and Observations).

Spathe, 2-flowered; valves often unequal, lanceolate, $1\frac{1}{2}$ —2 in. long, green with a membranous edge.

Pedicel, short.

Ovary, narrow, tapering at either end.

Tube, $\frac{1}{2}$ in. equal in length to the ovary.

Flowers, bearded, of a greenish yellow.

Observations.

This very imperfectly known Iris is in some ways intermediate between *I. flavissima* and *I. Bloudowii*, that is to say that it has the spathes of the former and the leaves and rhizome of the latter. All our knowledge of it is derived from dried specimens, and these seem to show that the spathes are more distinctly green than in either of the other two specimens.

It is probable that the branching stem of Komarov's specimen (K) is abnormal.

A better knowledge of this Iris may show that it is hardly sufficiently distinct from one or other of the allied species.

II. *The dwarf European Pogoniris.*

Great confusion prevails among this group of Irises, in which are included for the purpose of classification all those European bearded species which have unbranched stems. Complications have arisen from the fact that all the species are liable to colour-variation in their flowers. The secret of this variation has not yet been discovered but there seems little doubt that the yellow and purple colouring-matters, which are found in the flowers of this group, are very similar in their chemical constitution. It might have been thought that the various shades of colour were due to the various combinations of certain Mendelian characters, as has been established for Primulas, Antirrhinums, etc. But, in the case of Irises, there seems no doubt that other causes are also at work, for the colour of the flowers produced by the same plant varies from year to year. At present it is only possible to state the facts that have been already observed and to hope that at some future date the explanation of them will be forthcoming.

The first point, then, is that plants, which in one year produce flowers of the purest yellow are apt, even if they remain untouched in the same position, to have the purity of their flowers spoilt in subsequent years by streaks and veins of dull purple. I incline to think that this only occurs when the soil is naturally deficient in lime or at any rate when a sufficient proportion of lime is no longer within reach of the roots.

Another point is that an extract of the purple colouring-matter is immediately turned to a bright yellow by the addition of a solution of lime, although I have never seen any example of a purple flower streaked or mottled with yellow.

Further, I have more than once been told by residents in the South of France that in some localities only one colour form of *I. chamaeiris* occurs, while in others several forms are found growing together. Herbarium material is unfortunately not always a trustworthy guide to colour, but I certainly incline to the belief that the same phenomenon occurs in the case of *I. pumila*, e.g. in Greece the purple form is comparatively rare and the yellow common.

After these preliminary considerations, we can now proceed to the examination of those species which have been most commonly confused together, namely *I. pumila* Linn., *I. chamaeiris* Bert., *I. pseudopumila* Tineo, and a Balkan species, to which the name *I. Reichenbachii* Heuffel was probably the first given.

By *I. pumila* Linnaeus almost undoubtedly meant the Iris which is still common on the hills in the neighbourhood of Vienna, for he not only distinctly says that it grows on the hills in Austria but refers through C. Bauhin's Pinax, p. 33, to Clusius' History of Pannonian Plants, where we find a *chamaeiris latifolia minor purpurea* with a beard that was blue in front and yellow behind, which grew above Medeling (Mödling), Gumpostkirchen (Gumpoldskirchen) and Baden. Clusius also mentions a red and a blue flowered form.

In the face of this evidence we must not be led astray by the fact that in Linnaeus' herbarium at the Linnaean Society the specimen named "*I. pumila*" is not this Austrian plant, with practically no stem and a long perianth tube (cf. Fig. 16, p. 144) closely wrapped in a membranous spathe, but the plant from the South of France with an obvious, though short, stem, a comparatively short tube and a more inflated and less membranous navicular spathe (cf. Fig. 17, p. 149). This is the plant to which the name of *I. chamaeiris* was given by Bertolini, and it is forms of this Iris and not of the real *I. pumila* which are so common in our gardens and in the trade catalogues under the latter name. Indeed, it is often hard to find any true *I. pumila* in commerce except two light blue-flowered forms, to which the names *coerulea* and *azurea* are usually attached.

I. chamaeiris undoubtedly varies considerably in size and vigour but one instance will be enough to show that no great attention must be paid to this variation. At Mont Majour near Arles I found growing among the trees and bushes at the base, a yellow-flowered *I. chamaeiris* with a ten-inch stem, while about a hundred feet higher up on the open rocky side, I found a miniature copy of this with a stem not more than four inches high, the other dimensions being in proportion. After a year's growth side by side in my garden the two plants were identical in every way and the stems 6 in. high. Yet the difference between Hénon's *I. olbiensis* and typical *I. chamaeiris* is no greater than that of the size in this case, and specimens of *I. olbiensis* from the locus classicus on the Domaine du Ceinturon between Hyères and the sea have shown in my garden the extent to which their development even from year to year depends on the weather and on the soil in which they are grown.

Another distinguishing mark between *I. pumila* and *I. chamaeiris* is to be found in the foliage. Both species behave in winter as we should have expected two plants from Austria and the South of France respectively to behave. Thus the leaves of the Austrian *I. pumila* do not grow to any length until the winter is over while *I. chamaeiris* sends up new leaves early in the autumn, and they are therefore several inches in length in winter. These characters remain constant in cultivation and enable us to separate these two species even in winter. This difference in habit also makes *I. pumila* much hardier in English gardens than imported plants of *I. chamaeiris*.

The range of *I. chamaeiris* extends into north-western Italy. In the south and in Sicily it is replaced by a species which seems to combine many of the characters of *I. chamaeiris* with those of *I. pumila*. Thus the stem is several inches in length, as in *I. chamaeiris*, but it is almost entirely hidden by the sheathing leaves. The foliage is of some length in winter but the flowers have the long perianth tube of *I. pumila*.

In Portugal, in Spain, and probably also in North Africa, there is found a species which is closely allied to, if not indeed actually identical with, *I. pseudopumila*, namely the *I. subbiflora* of Brotero (see Plate XXXIII). The difficulty of cultivating, or at any rate of flowering, these two plants in England has hitherto made it impossible to obtain any light from breeding experiments on the question of their affinity. It has therefore seemed best to retain the names for the present, though a better knowledge of the plants may possibly show that we must look upon *I. pseudopumila* as little more than a synonym of *I. subbiflora*. There is perhaps a slight difference in the shape of the spathes, which makes it possible to separate them provisionally (see p. 145).

On the eastern side of the Mediterranean there is a corresponding dwarf Iris, which has been many times rechristened with such names as *suaveolens*, *balkana*, *bosniaca*, *serbica*, *macedonica*, etc. This *I. Reichenbachii* Heuff. is distinguished from its western relatives by the clearer and more transparent texture of its flowers (cf. Plate XXXII (*I. pumila*) with Plate XXXIV (*I. Reichenbachii*)) and by the very sharply keeled spathe valves¹. Just as *I. chamaeiris* is commonly either yellow or purple, so these two colours are represented in *I. Reichenbachii*, although the purple is of a curious brown shade of which a good example is found in the form that was first introduced into cultivation as *I. balkana*. All the forms of this Iris behave in winter as we should expect plants from the Balkans to do and lose their leaves entirely.

There remains only the dwarf *I. mellita* Janka from Southern Macedonia, which extends apparently also into Western Asia Minor. It has the green, keeled spathes of *I. Reichenbachii* but they are long and narrow and not navicular and the tube is relatively much longer. It was to a specimen (K) of this species, collected at Scutari, that Baker gave the name of *I. rubromarginata*.

The members of the group may be thus defined and separated:—

1. Spathes not sharply keeled.

- (1) Stem not produced or extremely short; tube at least three times as long as ovary and often much more, spathes membranous and closely wrapping the tube.

I. pumila (p. 142).

¹ It is a curious fact that *I. Sintensis*, which represents *I. spuria* in the Balkans, is also distinguished from that species by its sharply keeled spathes.

(2) Stem 4—8 in. long, bearing sheathing leaves or short bracts; tube 1½—2 in. long; spathes 1½—3½ in. long, navicular.

I. subbiflora (p. 145).

(3) Stem 4—8 in. long, bearing sheathing leaves; tube as in *I. pumila* but spathes rather broader and yet not navicular.

I. pseudopumila (p. 146).

N.B. This is probably to be considered as synonymous with *I. subbiflora*, see p. 141.

(4) Stem 2—10 in. long, always visible for part of its length; tube not much more than twice as long as the ovary; spathes shorter than in the preceding species.

I. chamaeciris (p. 148).

II. Spathes acutely keeled.

(1) Tube 2 in. or more long, spathes 2—3 in. long, narrow, tapering to a point above.

I. mellita (p. 149).

(2) Tube 1—1½ in. long, spathes 1½—2 in. long, navicular.

I. Reichenbachii (p. 151).

4† *I. PUMILA*

(PLATE XXXII)

Linn. Spec. Pl. ed. 1. p. 38 (1753).

*Jacquin, Fl. Austr. 1. t. 1 (1773).

*Bot. Mag. t. 9 (1787), t. 1209 (1809), t. 1261 (1810).

*Red. Lil. v. t. 261, 262 (1809).

Host, Fl. Austr. 1. p. 46 (1827).

*Reichb. Icon. CCCXXVII. figs. 752, 753, and CCCXXVIII. figs. 754, 755 (1847).

*Trans. Russ. Hort. Soc. t. 103, fig. 2 (1862).

Baker in J. L. S. XVI. p. 143 (1877).

Hdk. Irid. p. 26 (1892).

Boiss. Fl. Or. v. p. 133 (1884).

*Revue Horticole, 1903, p. 132.

SYNONYMS.

**I. violacea*, Sweet, Hort. Brit. ed. 1. p. 393 (1826).

**I. taurica*, Lodd. Bot. Cat. no. 1506 (1829).

**I. Clusiana*, Reichb. Icon. CCCXXVIII. fig. 754 (1847).

[This is stated in the text to be wrongly named; the figure represents *I. tristis* Reichb.]

I. corulea, Spach, Hist. Veg. Phan. XIII. p. 50 (1846).

**I. tristis*, Reichb. Icon. IX. p. 3 (1847).

I. attica, Boiss. et Held in Boiss. Diagn. pl. Or. ser. 2, IV. p. 91 (1859).

*Regel, Gartenfl. p. 343, t. 377, fig. 2 (1862).

I. stenoloba, A. DC. ex Baker in J. L. S. XVI. p. 143 (1877).

I. aequiloba, Ledeb. Fl. Ross. IV. p. 104 (1853), from Ledeb. Ind. Sem. Hort. Dorpat, 1823, p. 4.

I. transsylvanica, Schur in Verh. Siebenb. Ver. Naturwiss. IV. Anhang, p. 73 (1853).

DISTRIBUTION.

Austria. Modling, 1804, Gebhard (B).

18—, Leithner (V) (BM).

Geisberg, 1838, Kováts (B).

1910, Wagner (HortD).

Bisamberg, 1890, Richter (B) (V).

1900, Krebs (E).

Kreuzberg (Vienna), 1878, Braun (V).

Hundskogel and Sattelkogel, near Giesshubel, 1897, Dörfler (E) (BM).

Sattelkogel, 1895, Krebs (E).

Nikolsburg (Pollauer Gebirge), 1907, Petrak (E).

1868, Niesch (V).

Sokolnitz, 18—, Hb. Auerswald (BM).

Hungary. Ofen and Blocksberg (Budapest), 1872 and 1875, Richter (V) (K) (O) (BM) (B).

Wolfsthal (near Ofen), 1881, Steinitz (B).

Mt Meleghegy (S.E. from Budapest), 1871, Tauscher (V).

Pest, 1879, Tauscher (V).

Hermannsdorf, 18—, Schur (V).

1851, Andra (B).

Mühlbach, 1872, Csato (B).

Langenthal, 1881, Barth (V).

1903, Barth (B).

Nagy-enyed, 1885, Csato (B).

1878, Csato (V).

Klausenberg, 18—, Wolff (V).

Dobrudja. Tulscha, 1872, Sintenis (B).

Malkody, 1872, Sintenis (K).





- Greece.* Hymettus, 1848, Heldreich (BM).
 1851, Heldreich (V).
 1852, Orphanides (V) (B).
 Deceleia (Tatoi), 1889, Heldreich (K).
 Parnassus, 1876, Pichler (K) (B).
 1857 and 1876, Heldreich (B).
 1852, Heldreich (V).
 No locality, 1842, Boissier (K).
 Mt Karidili (Euboea), 18—, Wild (B).
 Mt Malevo (Laconia), 18—, Orphanides (B).
 Pharmacusae Is. 1879, Heldreich (B).
 Salamis, 1893, Heldreich (B).
 Pentelicon, 1854 and 1870, Heldreich (B).
 Olympus, 1870, Kruper (B).
Russia. South Russia, 1828, Prescott (K) (E) (C).
 Odessa, 1893, Kamienski (K) (V) (BM) (B).
 1875, Blau (B).
 Crimea, 17—, Hb. Pallas (BM).
 1855, Munro (K).
 Sebastopol, 1900, Syrejszczikow (V) (B).
 Charkow, 1861, Lindemann (V).
 Ukraine, 1822, Tscherniaiew (B).
 Volga, 17—, Pallas (V).
 Sarepta, 18—, Wunderlich (V) (K).
 1898, Becker (B).
 1887, Becker (B).
 1879, Becker (BM).
 Orenburg, 18—, Lessing (B).
 Tanais (Don), 1843, Kolenati (B).
 Transcaucasia, 1886, Okye (B).
 Caucasus, 18—, Radde (K).
 Elizabethgrad, 1827, Prescott (C).
 Temir-khan-shura (Caucasus), 1910, Meyer (HortD).
Asia Minor. Cilicia, Karasubasar, 1900, Halacsy (B).
 Sudek, 1896, Collier (E) (K) (V).
 Mysia; Balikesri, 1882, Calvert (B).
 Troad, Ilium, 1879, Virchow (B).
 Phrygia; Karaja, 1901, Warburg (B).

Natural hybrids.

It is probable that in Transylvania, where *I. pumila* and *I. aphylla* grow in close proximity, natural hybrids between the two species have arisen. In these hybrids the inflorescence becomes more complex than that of *I. pumila* and yet not so ample as that of *I. aphylla*. The influence of *I. pumila* is seen in the long perianth tube.

To such hybrids the following names are probably to be referred:—

- I. diantha*, C. Koch in Linnaea, XXI. p. 637 (1848).
I. binata and *I. diantha*, Schur in O. B. Z. x. p. 354 (1860).
I. scapifera, Borbas?

Cf. also the following specimens.

- Rotberg (Transyl.), 1902 and 1903, Barth (B).
 Langenthal (Transyl.), 1899, Barth (V), and 1902, Barth (B).

Colour varieties.

The purple variety described in detail is perhaps the most common but there are many other forms. I am told that on the Geisberg near Vienna quite half a dozen forms can be found in close proximity, and certainly a series of plants collected for me in that neighbourhood have shown great variations in colour. Further east, in Russia and in Greece, the yellow forms appear to be the more numerous. This has been indicated by plants that I have received from the Caucasus and by others that I have raised from seeds from the same locality, by Sir Michael Foster's MS. notes of plants that he received from the Caucasus and from Greece, and by the evidence of herbarium specimens, though the latter cannot always be trusted in matters of colour. The following are some of the varieties that I have had in cultivation.

(1) A very dark black red, larger and of richer colouring than the purple flower shown in Plate XXXII, from the neighbourhood of Vienna (HortD).

(2) A pale straw yellow with a faint tinge of green and inconspicuous purplish veins. The blade of the falls bears a brown purple or greenish brown patch. This comes from Mt Pentelicon and from the Caucasus. It is the *I. attica* of Boissier and Heldreich (HortD).

(3) The pale purplish blue forms, known in cultivation as *coerulea* and *azurea* (see Plate XXXII). There are at least two forms, to which either of these names is applied indifferently, but one is slightly

larger than the other and always, in my experience, decidedly more floriferous, even when the two are grown side by side under apparently identical conditions (HortD).

(4) A form with very narrow segments, possibly that described as *aequiloba*, of a dull reddish purple colour (HortD).

(5) A pale primrose yellow with a faint bluish blotch on the falls. See Plate XXXII. This was collected with (1) near Vienna (HortD).

(6) A beautiful blue purple form with a grey blue beard from Moravia. The shade of colour is almost that of *I. Madonna*, Plate XXXV (HortD).

(7) A bright red purple form similar in colour to *I. Kochii* (Plate XXXVI). This also was sent to me from Moravia (HortD).

Diagnosis.

I. pumila Pogoniris; *caulis* obsoletus; *spathae* plerumque uniflorae, valvis membranaceis, informibus; *tubus* elongatus.

Description.

Rootstock, a slender rhizome with crowded growths.

Leaves, linear, slightly glaucous, 3—4 in. long by $\frac{1}{4}$ — $\frac{1}{2}$ in. broad at flowering time, and growing afterwards to twice that size; the foliage dies away in autumn, the new leaves not appearing until the spring.

Stem, barely $\frac{1}{8}$ inch, 1-headed.

Spathe valves, 1—2-flowered, narrow, green, scarious at the tip only, 2 in. long. The inner valve is membranous and closely wraps the tube, the outer valve is slightly more rigid and may be very slightly keeled.

Pedice, none.

Ovary, rounded trigonal, about $\frac{3}{8}$ in. long.

Tube, 2 in. long, with three purple stripes in the line of the standards.

Falls. Nearly 2 in. long, of a rounded oblong cuneate shape, $\frac{1}{2}$ in. wide, the blade being of a dark red purple and the haft veined with parallel purple veins alongside the beard and with brownish purple branching veins at either side on a lighter ground. The beard is bluish in front, then white and finally yellowish. (Various colour-forms are also common, yellow, white and blue, as described above.)

Standards, 2 in. long, wider than the falls, emarginate, oblong unguiculate, the blade of red purple with inconspicuous darker veins narrowing suddenly to the haft, which is veined with brown purple.

Styles, 1 in. long, almost colourless at the edges with a blue-purple keel, somewhat oval in shape.

Crests, red purple, deltoid with serrated outer edge.

Stigma, entire, of a rounded tongue shape.

Filaments, nearly colourless or slightly tinged with blue.

Anthers, bluish or cream, about equal in length to the filament.

Pollen, blue in the purple forms, in the others cream.

Capsule, trigonal, pointed, $1\frac{1}{2}$ in. long, sessile or very nearly so, opening below the apex to which the withered tube remains attached.

Seeds, small, spherical, wrinkled, light brown, without any strophiole.



FIG. 16. Inflorescence of *I. pumila*, showing the long tube, short stem and a second abortive flower.

Observations.

This was the sixth *Iris* on Linnaeus' first list but the fact that in what remains of his herbarium *I. pumila* is only represented by a specimen of *I. chamaeciris* leads us to doubt whether in practice he distinguished the two plants (see also p. 141).

I. pumila is undoubtedly a variable plant, but it is probable that all the variations except those of colour would tend to disappear, if the plants were cultivated under similar conditions. Moreover, in any large collection of specimens, anomalies will be found to show the futility of giving varietal names. For instance, most specimens from the Volga district have comparatively long and narrow leaves and yellow flowers (see Trans. Russ. Hort. Soc. I.c.), but among Becker's specimens (B) there are exceptions to this rule and examples with purple flowers. Similarly, although on the whole the foliage of Greek plants tends to be more falcate than that of the Austrian type, this feature is not invariably found. In this connection, it may be mentioned that the falcate character of foliage tends to disappear in cultivation in richer soil than that in which the plants are found growing wild.

Unless, therefore, we give a name to every small variation, which in practice would become intolerable owing to the multiplicity of names, it seems better merely to define the species as varying within certain limits and as distinguished by certain characteristics, of which the most obvious are:—

- (i) The almost complete absence of stem. (ii) The narrow, membranous spathe, closely wrapping the lower part of the tube. (iii) The absence in winter of foliage of any length.

The cultivation of this Iris is not difficult, provided that the position is sunny and well drained and the soil not deficient in lime. Probably heavy soil suits the plant better than pure sand but in any case drainage is essential.

The plants may be lifted and divided with benefit soon after the flowers have faded, for the growths are very closely packed and the soil tends to become exhausted.

Seeds are not easily obtained and some forms seem to be sterile in cultivation, even when artificially pollinated. However, any seeds that are obtained germinate quickly and the seedlings soon reach flowering size. I have even had a case of a seedling which germinated early in the spring and flowered in the autumn. This was doubtless exceptional, but all seedlings should flower within eighteen months of the time at which the seeds germinate.

The species seems to be very variable in several points, for some specimens are very sweetly scented and smell like Heliotrope, while others appear to have no fragrance at all. Every shade of blue and red purple seems to occur, and the beards also vary in amount of yellow at the base. In some this becomes almost a bright orange, while in others it is nearly entirely obscured by a bluish tinge.

† *I. SUBBIFLORA*

(PLATE XXXIII)

Brotero, Fl. Lusit. i. p. 50 (1804).

•Phyt. Lusit. ii. p. 47, t. 96 (1827).

•Bot. Mag. t. 1130 (1808).

Coutinho in Boll. Soc. Brot. xv. p. 65 (1898).

Rouy, Rev. Bot. Syst. i. p. 29 (1903).

SYNONYMS.

I. biflora, Linn. Sp. Pl. p. 38 (1753) [In part only, because Linnaeus' description is probably based on a confusion; see Observations].

I. fragrans, Salisb. in Trans. Hort. Soc. i. p. 303 (1812).

I. lisbonensis, Dykes in Gard. Chron. XLVII. p. 146 (1910) [see Observations].

DISTRIBUTION. Portugal, the south of Spain, and also probably N. Africa.

Portugal; Coimbra, 1878, Moller (K).

1909, Henriques (HortD).

Arredores de Coimbra; Ponsada, 1888, Moller (B).

Lisbon, 1848, Welwitsch (BM) (C).

1871, Maw (K).

1846, Trevelyan (K) (E).

Estoril, 1910, Tait (HortD).

Monsanto, 1850-51, Welwitsch (K) (C).

1875, Escola Polytechnica (K).

1911, Pereira Coutinho (Esc. Polyt. Coimbra).

1877, Daveau (C).

Cascaes, 1848, Trevelyan (C).

Estremadura, 1848, Welwitsch (C) (BM).

Moncorvo, 1911, Tait (HortD).

Spain. Ronda (Sierra de la Hidalga), 1910, Bartle Frere (HortD).

North Africa. Tangiers, 1872, Blackmore (K).

Diagnosis.

I. subbiflora Pogoniris; *I. pseudopumilae* valde similis sed *spathae* latiores subacuminatae.

Description.

Rootstock, a compact rhizome, about an inch in width.

Leaves, 4-8 in. by $\frac{1}{2}$ -1 in., ensiform, often narrowing suddenly to an incurved point.

Stem, about 8-12 inches in height, usually bearing small clasping leaves of varying length which almost entirely hide it, and usually only one flower.

Spathae, 1-2 flowered; valves acute, often scarious in the upper half and sometimes tinged with purple, varying in length from $1\frac{1}{2}$ to $3\frac{1}{2}$ in., the outer slightly keeled.

Pedicel, very short.

Ovary, obscurely trigonal.

Tube, $1\frac{1}{2}$ -2 in. long, with purplish stripes in the line of the standards.

Falls. The obovate blade is not separated by any constriction from the broad wedge-shaped haft, which is veined with broad veins of brown purple on a whitish ground. The blade is of a deep blue purple, and the hairs of the beard are bluish in front, then white tipped with blue and finally with brownish yellow.

Standards, obovate with a short, canaliculate haft, rather lighter in colour than the falls, with faint darker veins. The haft is veined with red brown on a pale ground.

Styles, almost colourless with a central blue keel.

Crests, triangular, acuminate.

Stigma, entire.

Filaments, pale violet.

Anthers, bluish.

Pollen, bluish.

Capsule, not seen.

Seeds, brown, wrinkled, pyriform.

Brotero l.c. remarks that this *Iris* may have paler or yellowish white flowers. I have seen no specimens of this, but one has recently been obtained from the Moncorvo neighbourhood.

Observations.

This *Iris* was first observed by Clusius in the neighbourhood of Coimbra in Portugal about 1565 and described and figured by him as *Iris lusitanica* *sen biflora* on pp. 282-3 of his History of Rare Spanish Plants (1576). He there states that he found plants in flower in November and gave it the name of *biflora* on account of its habit of flowering in the autumn as well as in spring. Clusius' figure shows the small acute spathes and the clasping bract-like leaves on the stem and there is a similar figure in the Hortus Eystettensis with the name of *portugolica*. The *biflora* in that work is almost certainly the Central European *aphylla*, and it is probably by a misquotation of these two figures that Linnaeus first began the confusion between *I. biflora* and *I. aphylla*, which continued down to, and even after, the publication of Brotero's *I. subbiflora* which is expressly stated to be the *biflora* of Clusius but not of Linnaeus.

On examining some specimens of this *Iris* in the Kew herbarium, I found one or two examples from Monsanto in the immediate neighbourhood of Lisbon of an *Iris* that appeared to differ from the typical *I. subbiflora* by the much longer spathes and tube. A description was published under the name of *I. lisbonensis* in the Gard. Chron. for March 5th, 1910, p. 146, and this led to some correspondence with Professor Henriques of Coimbra, who has most kindly sent me recently a series of plants, all collected in the neighbourhood of Lisbon and showing intermediate stages between the typical *I. subbiflora* and the plant that I described as *I. lisbonensis*. In the face of this evidence, we can only extend the limits of the dimensions of *I. subbiflora* and conclude that it is more variable in structure than most species of *Iris* fortunately appear to be.

The cultivation of this *Iris* is not easy in England. The text that accompanies the figure in the Botanical Magazine (l.c.) states that the flowers were the first produced for fifteen years and my own experience has been similar. The plants need that rest in summer that they obtain on their native limestone rocks, and in cultivation in England this is perhaps best ensured by growing the plants in pots and leaving these to dry and bake in a frame for three or four months in summer. Growth begins again with the autumn rains and it was by this treatment that the flower was obtained from which Plate XXXIII was drawn. The soil in the pots should be made porous by a liberal addition of lime rubble but a fair amount of humus should be added in the shape of old leafsoil, for roots confined to a pot must have more concentrated food than when they can spread to greater distances in the open ground. The extraordinary summer of 1911 and the warm spring of 1912 caused some plants from Coimbra to flower well on an open rockery in my garden.

In 1895 Foster received from Messrs Dammann an *Iris* which was collected in the mountains of Tunis. When it flowered it proved to be very similar in all respects to *I. subbiflora*. It is not now apparently in cultivation and no specimens from Tunis are to be found in herbarium collections. There exists, however, one from Tangiers and it is not impossible that this *Iris* will be found to be more widely spread in North Africa than is at present known to be the case.

+*I. PSEUDOPUMILA*

Tineo, Cat. Hort. Panorm. 1827, p. 283.

Parlat. Fl. It. III. p. 287 (1858).

Baker in J. L. S. XVI. p. 143 (1877).

Hdk. Irid. p. 26 (1892).

SYNONYMS.

I. panormitana, Todaro, Nuov. Gen. e Spec. I. p. 3 (1856).

Lojac. Fl. Sic. III. p. 70 (1909).

I. pumila, Bivona, Sic. Pl. II. p. 32 (1807).

I. lutescens, Gussone, Cat. Hort. Bocc. p. 103 (1821).

[*I. Statellae*, Tod. l.c. p. 5 (1856), is either a sport or a garden hybrid of *I. pseudopumila* for, when self-fertilised, it gives seedlings, which are typical *I. pseudopumila*. This was Foster's experience (MS.) and it has also been my own. *I. erratica*, Tod. l.c. p. 10, is probably a similar hybrid and is illustrated in the Bot. Mag. t. 6894 (1886), under the erroneous name of *I. Statellae*.]





CXXI

Iris sibirica



DISTRIBUTION. Sicily and Southern Italy.

- Sicily.* Palermo, 18—, Tineo (V).
1904, Ross (E).
Monreale (Palermo), 1827, Todaro (C) (B).
San Martino, 1855, Huet du Pavillon (C) (V).
Floridia to Palazzolo, 1840, Gussone (B).
Syracuse to Lentini, 1869, Gansauge (B).
Apulia. Gargano, 1875, Porta et Rigo (B) (K).
Le Murgie di Ruvo, 18—, Iatta (stems 1 in. only) (Hb. Terracciano).

Diagnosis.

I. pseudopumila; Pogoniris; inter *I. pumilam* et *I. chamaeiris*; *caulis* simplex, 3—8 pollicaris, foliis obtectus; *spathae* plerumque uniflorae, valvis rotundatis; *tubus* ovario plus quam duplo longior.

Description.

Rootstock, a compact rhizome with crowded growths, of a somewhat greenish brown colour.

Leaves, 4—6 to a tuft, 6—8 in. long, narrowing abruptly to an incurved tip, greyish green, glaucescent.

Stem, 4—7 in. long, raising the single flower just above the leaves and almost entirely, if not quite, concealed in reduced clasping leaves.

Spathes, 1-flowered, valves pale green, rounded, slightly inflated, 2—3 in. long, reaching to or above the top of the tube.

*Pedice*l, under $\frac{1}{4}$ in.

Ovary, rounded trigonal, slightly more than $\frac{1}{2}$ in. long.

Tube, 2—3 in.

Falls, with an obovate blade and wedgeshaped haft, slightly shorter than the standards. The colour may be either blue or red purple, yellow or white. The beard is usually of whitish hairs tipped with yellow.

Standards, rounded oblong with short canaliculate haft, rather paler in colour than the falls.

Styles, broad, keeled.

Crests, triangular, revolute.

Stigma, entire.

Filaments,

Anthers,

Pollen,

Capsule,

Seeds,

Observations.

This Iris is unfortunately scarcely hardy in England and, although it has been introduced from Sicily on several occasions, it always seems to die out after a few seasons. This difficulty has made it impossible to decide whether there is any real difference between the larger specimens of *I. chamaeiris* from the Ligurian coast and examples of *I. pseudopumila* from Apulia and Sicily. In any case the difference is small and lies chiefly in the narrower spathes and in increased length of the tube and of the leaves, relatively to the length of the stem. Another feature that is nearly, if not always, constant, is that the spathes of *I. chamaeiris*, especially in Italy, bear usually two flowers, whereas *I. pseudopumila* rarely produces more than one flower. The fact, too, that no connecting links are apparently to be found between the neighbourhood of Pisa and Livorno (Leghorn) and Apulia in the south, points to the existence of two species.

I. pseudopumila differs on the other hand from *I. pumila* by the presence of a stem of greater length than the tube. In this connection mention must be made of two specimens from Le Murgie di Ruvo in Apulia among a collection lent to me by Professor Terracciano, in which the stems are reduced to a bare inch in length, so that the plants are practically indistinguishable from the true *I. pumila*. There is no means of knowing whether these specimens are abnormalities produced by some accident to the individual¹, but unless this is the case *I. pumila* and *I. pseudopumila* must be much more closely related than appears to be the case at first sight.

For the relation between this Iris and *I. subbiflora* see p. 141.

Little is known of this Iris in cultivation but it is probable that a well-drained limestone soil in a sunny, warm position or the pot cultivation recommended for *I. subbiflora* would suit it best.

¹ All rhizomatous Irises are apt at times to produce stemless flowers, low down at the base of the leaves.

†† *I. CHAMAEIRIS*

- Bertolini, Fl. Ital. III. p. 609 (1837).
 Parlatores, Fl. Ital. III. p. 291 (1858).
 Baker in J. L. S. XVI. p. 144 (1877).
 Hdk. Irid. p. 27 (1892).

SYNONYMS.

- I. italica*, Parl. Nuov. gen. e spec. p. 37 (1854).
 Fl. Ital. III. p. 285 (1858).
I. pumila, Linnaeus MS. on specimen (L. S.).
 Vill. Hist. Pl. Dauph. II. p. 224 (1787).
 Savi, Bot. Etrusc. II. p. 10 (1815).
I. lutescens, Lam. Encycl. III. p. 297 (1789).
I. lutescens, Delarb. in Red. Lil. v. t. 263 (1809).
I. olbiensis, Hénou in Ann. Soc. Agr. Lyon VII. p. 462 (1855).
 *Bot. Mag. 6110 (1874).
I. virescens, Delarb. in Red. Lil. v. t. 295 (1809).
I. neglecta, Parl. Nuov. gen. e spec. p. 41 (1854).

DISTRIBUTION. The South-East coast of France and the North-West coast of Italy.

- France*. *Vaucluse*: Bonnieux (Léberon), 1864, Mills (K).
Bouches du Rhône: Aix, 1858, Lortet (K).
 Arles (Mt Majour), 1859, Lortet (K).
 1911, Dykes (HortD).
 1864, Jordan (BM).
 Marseilles, 1877, Porter (K).
Gard: Nîmes, 1857, Boullu (BM).
 Pont du Gard, 18— (O).
 „ 1836, Munby (K).
 Villeneuve-Les-Avignon, 1860, Mill (K).
Hérault: Montpellier, 1832 (V).
 „ 1840 (B).
 „ Bois de Lavalette, 1847, Munby (K).
 Balaruc, 1910, Dykes (HortD).
 Béziers, 1854, Martrin (C).
Var: Hyères (Domaine du Ceinturon), 1908, Raikes (HortD).
 Mt Coudon, 1909, Raine (HortD).
 Hyères, 1867, Moggridge (K).
 1872, Mill (K).
 Mt Estérel, 1911, Brock Hollinshead (HortD).
Alpes Maritimes: Villefranche, 1878, Laire (B).
 Nice, 1859, de Coutas (K).
Italy. Caprazoppa, 18—, Webb (K).
 Noli, 1867, Joad (K).
 Pisa, 1877, Groves (K), Roberti (B).
 San Giuliano (Pisa), 1880, Groves (K).
 1861, 1878, Groves (E).
 Livorno (Ardenza), 1836, Hort. Pisan. (B).
 [Switzerland. Sion (Valais), 1871, Favrat (K) (V).
 1885, Wolf (B).
 1890, Petit (B).
 Tourbillon, 1856-7, Oertel (BM).
 This is *I. virescens*, Delarb. in Red. l.c. cf. Godr. Fl. Fr. III. p. 240. See Observations.]

Diagnosis.

I. chamaeiris Pogoniris; *caulis* simplex, 1—10 pollicaris; *spathae* plerumque uniflorae, valvis subscariosis, rotundatis; *tubus* ovario subaequalis vel duplo longior.

Description.

- Rootstock*, a compact rhizome with crowded shoots.
Leaves, ensiform, slightly glaucous, 3—6 in. by $\frac{1}{2}$ — $\frac{1}{3}$ in. at flowering time.
Stem, 1—10 in., bare in the upper part, with one or two reduced leaves attached below the centre; one headed. (In very rare cases a lateral 1-flowered branch may develop.)
Spathes, 1—2-flowered; valves green or scarious in the upper third, slightly inflated; one valve may be very slightly keeled, $1\frac{1}{2}$ —2 in. long.
Pedicel, very short.
Ovary, obscurely trigonal.
Tube, about 1 in. long.
Falls. The obovate blade tapers gradually into the wedge-shaped haft, which bears diffuse veins on

a light ground. The colour is either blue or red purple, yellow or white, with a contrasting beard, either yellow, or white tipped with yellow or even bluish.

Standards, rounded oblong with a canaliculate haft, slightly shorter than the falls, but usually a little wider.

Styles, paler than the segments except along the deeper-coloured keel.

Crests, small, trigonal.

Stigma, entire.

Filaments, white or tinged with purple.

Anthers, cream or tinged with purple.

Pollen, cream.

Capsule, $1\frac{1}{3}$ — $2\frac{1}{2}$ in. long, oblong or oval in outline, the valves remaining attached together at the extreme tip after they have split open lower down. The section is rounded trigonal with a raised line running down each face.

Seeds, red brown, pyriform, with wrinkled skins.

Observations.

This is the common dwarf Iris of the South of France and North Italy and is also the ancestor of most of the garden forms that are so commonly known as *I. pumila*. It is distinguished from the true *pumila* by the obvious stem, by the shorter tube and by the more inflated and less membranous spathes¹. In cultivation it has the advantage that the new leaves attain some length before winter, but owing to this early habit of growth, imported plants are often less able to resist our winter than *I. pumila*. Like the latter, *I. chamaeiris* is very variable in colour and in dimensions and has received many names. Thus Lamarck's *I. lutescens* is clearly a yellow flowered example such as are common in the south of France. Hénon's *I. olbiensis*, with its various colour forms, differs in no essential from the more westerly specimens and *I. virescens* D.C. from Sion in the Rhone Valley is probably only an introduction from the south, for it grows on a hill, crowned with ruins, on which there also grows an *Opuntia*, that is likewise probably an escape from a formerly cultivated area. In cultivation the Sion plant is indistinguishable from examples of Hénon's *I. olbiensis* from the neighbourhood of Hyères. In this connection it must be remembered that there was in ancient times a town of Olbia, near the actual site of Hyères, and that this must not be confused with another Olbia on the coast of the Black Sea, a little to the East of Odessa. The confusion of these two names was probably the origin of the term "Crimean," applied by trade catalogues to dwarf-bearded Irises. Any specimens from the Crimea are always found to be *I. pumila* and not *I. chamaeiris*.



FIG. 17. *I. chamaeiris*, showing stem, spathes, ovary and perianth tube.

It does not seem possible to separate a variety *italica*, based on Parlato's *I. italica* (v. supra). Baker's statement (Hdk. p. 27) that it differs by having dark violet flowers does not agree with Parlato's original description of a variety C, "flore flavo." The height of Italian specimens is as variable as those from France already mentioned on p. 141. Cf. Groves' (E) specimens: that of 1861 has a 3 in. stem while that of 1878 is no less than 10 in. high.

The cultivation is the same as that of *I. pumila* except that a position which gives some protection from frost and cold winds is desirable, especially for imported plants.

†† *I. MELLITA*

Janka, Magyar tud. akad. math. XII. p. 173 (1874).
Termes. Fuzetek. vol. I. pt. IV. 1877.

SYNONYM.

I. Straussii, Micheli in Revue Hort. 1899, p. 363.
Dykes in Gard. Chron. 1909, I. p. 391

† var. *rubromarginata*

SYNONYM.

I. rubromarginata, Baker in Gard. Chron. 1875, I. p. 524.
Hdk. Irid. p. 30 (1892).

DISTRIBUTION. Thrace (S.-E. Turkey) and North-Eastern Asia Minor.

Thrace. Philippopolis; Tschindem Tepe, 1891, Sintenis (K) (BM) (B).
1891, Pichler (BM) (V) (B).
1892, Stribny (B).
1893, Stribny (V) (E) (B).
1896, Stribny (K).
1902, 1906, Stribny (E).

¹ See also the introductory remarks on the group on p. 141.

- Mt Rhodope, 1906, Adamovic (B) (K) (V).
 Vaden (Macedonia), 1900, Adamovic (K).
 Uskub (Gornje-Voda), 1893, Dorfler (V).
 Kilid-bahar (Chersonese), 1856 (E).
Asia Minor. Scutari, 187-, Barbey (K).
 Troad; Thymbra, 1883-4, Sintenis (E) (B) (K) (BM).
 Dorastri Tepe, 1879, Virchow (B).
 Koum-Kale, 1856 (E).
 Batak, 1856 (E).
 Smyrna, 1894, 1895, Whittall (K).
 Anatolia; Kutschuk Ichamlidjeh, 1864, du Parquet (BM).
 Phrygia; Eski-shehir, 1879, Danford (K).

Diagnosis.

I. mellita Pogoniris; *I. pumilae* affinis sed *spathae* rigidae, diversae, acute carinatae nonnunquam purpureo suffusae, plerumque pallide virides, etiam in planta fructifera herbaceae remanentes; *caulis* nunc brevissimus, nunc 3—5 pollicaris.

Description.

Rootstock, a compact rhizome with crowded tufts of leaves.

Leaves, thin, ensiform, more or less fulcate and occasionally tinged with red at the edge. 3—5 in. by $\frac{1}{2}$ — $\frac{1}{2}$ in.

Stem, 1-headed, very short or as much as four or five inches in length.

Spathes, quite green, sharply keeled, closely resembling the leaves, remaining green long after the flowers have faded, sometimes flushed with red along the edge, acuminate, slightly ventricose, divergent, and exposing the tube. 1—3-flowered, 2—3 in. long.

Pedicel, very short.

Ovary, cylindrical with six lines at equal intervals.

Tube, $1\frac{1}{2}$ —2 or more inches long, greenish mottled with purple.

Falls, shorter and narrower than the standards, obovate cuneate, with the blade much reflexed and often pressed against the tube. The colouring is peculiar, the haft being veined with red brown on a grey white ground. On the blade the ground is a pale smoky brown veined with fine deep veins. About the end of the beard the texture is more velvety and the colour becomes a warm red purple shot with electric blue. The beard is conspicuous, composed of relatively long, thickset hairs, white at the base and blue above.

Standards, obovate with a short channelled haft, which on its inner surface usually bears a few straggling hairs. The standards are both longer and broader than the falls and deeper in colour, but with similar fine veins. At the base the veins give place to small dots and blotches.

Styles, narrow, grey white, with a purple keel.

Crests, small, triangular, with a serrate outer edge.

Stigma, oblong, entire.

Filaments, white, tinged with purple.

Anthers, white, tinged with blue.

Pollen, bluish white.

Capsule, trigonal, tapering slightly to a pointed upper end, with thin walls, 2— $2\frac{1}{2}$ in. long.

Seeds, almost spherical, deep red brown, wrinkled.

Observations.

I. mellita seems to stand in much the same relation to *I. Reichenbachii* as *I. pumila* to *I. chamaeiris*. The Balkan plants are distinguished by their sharply keeled spathes and by the clear thin texture of the segments of the flowers. From *I. Reichenbachii* *I. mellita* is separated by the long narrow spathes and by the relatively longer perianth tube. The development of a short stem, which is rare in examples of *I. pumila*, is fairly common in *I. mellita*, where it may vary from less than half an inch to as much as four or five inches. This was pointed out by Janka in his original description¹ and it is clearly seen when a number of specimens are compared together. Thus specimens from the neighbourhood of Philippopolis have stems some less than one inch and some more than four inches in length, while some of the Troad specimens have stems of barely $\frac{1}{2}$ in.

When the stem is so short that it is entirely clothed by the bases of the leaves, the whole plant closely resembles *I. pumila* except that it has that look of refinement which is characteristic of the Balkan as opposed to the Austrian and French dwarf Irises. Botanically, the difference lies in the spathes. In *I. pumila* these closely wrap the tube and the inner valve at least is membranous and at the tip even scarious. In *I. mellita*, on the other hand, the spathe valves are divergent, exposing the tube, and remain green long after the flowers have faded. Moreover, they are very acutely keeled and closely resemble the leaves that clasp the stem. In fact the leaves only differ from the spathes in that the two surfaces are joined together along both edges for a short distance below the apex.

¹ 1c. Caulis semper manifestus, nunc brevissimus vix pollicaris, nunc 3—5 pollicaris.

Hitherto, I have seen no evidence that yellow-flowered forms exist in Europe, but such specimens occur among Sintenis' plants from the Troad (K) (BM) and others were sent to Kew from Smyrna by Whittall (K).

In cultivation, *I. mellita* is distinctly a plant for the rock garden, where it does well in a sunny, well-drained position in a limestone soil. It should be transplanted every two or three years, for these small lris es seem to exhaust the soil within reach of their somewhat limited root-system, if left too long in the same place. The only alternative is to topdress the plants in spring and autumn with a mixture of limestone chips and old leafsoil, but this plant has the disadvantage that unless great care is used the rhizomes may become too deeply buried, in which case the plants will not thrive.

Seeds are easily obtained by artificial pollination and the young plants grow rapidly and should flower in a year from the time the seedlings appear.

The variety *rubromarginata*, which was discovered by Barbey, the son-in-law of Boissier, near Scutari, was described as a species by Baker, possibly before he had seen the description of Janka's *I. mellita*, which only appeared in the previous year. In the original description the only difference is found in the length of the stems and this is admittedly variable in the case of *I. mellita*. When Janka republished his paper in 1876, he made *rubromarginata* differ from *I. mellita* in its obtusely and not acutely keeled spathes, though the authority for this statement is not obvious, seeing that Baker had described his plant as having acutely keeled spathes.

After cultivating side by side for some years some plants, which Mons. Correvon tells me came from Barbey's original collection and specimens of *I. mellita* from the Balkans, I am convinced that they must be looked upon as varieties of the same species. Specimens of *rubromarginata* vary in the amount of red on the leaves. This feature is most prominent in early spring and on new growths at any time but sometimes it is quite inconspicuous and seems in any case to fade away as the leaves mature. Moreover a red flush is not unknown on *I. mellita* from the neighbourhood of Mt Rhodope and we may also compare such varieties of *I. germanica* as Kharpuz and Amas, whose leaves show the same feature at early stages of their growth.

The variety *rubromarginata* is always apparently very dwarf and the young red flushed leaves therefore appear from the first more falcate than those of *I. mellita*, although the central leaves of each tuft are quite erect.

The flowers both of the type and of the variety agree closely in their colouring, shape and proportions.

Since the red edge to the leaves disappears as they are dried, it is usually impossible to separate the variety from the type among herbarium specimens, which may be distinguished from *I. pumila* by the divergent, herbaceous, sharply keeled spathe valves.

††*I. REICHENBACHII*

(PLATE XXXIV)

Heuffel in Verh. ZBG. Vienna VIII. p. 206 (1858).
in OBZ. VIII. p. 28 (1858).

SYNONYMS.

I. serbica, Panč. Fl. Belgr. p. 243 (1883).

I. Athoa, Foster in Gard. Chron. 1893, I. p. 711.

I. bosniaca, Beck, Ann. K. K. nat. Hofmus. Wien II. p. 51 (1887).

*Wiener Illust. Gartenzeit. 1895, t. 2.

*I. macedonica*¹, Nadji (Chavrel), Emp. Ottom. Pl. de Salon. p. 40 (1892) [specimen in Herb. (B)].

I. balkana, Janka, Adat Erd. in Mag. Tud. Akad. math. és term. kozl. XII. p. 173, t. 14 (1874).

I. Reichenbachiana, Baker, Hdk. Irid. p. 32 (1892).

I. Skorpiti, Velen. Fl. Bulg. p. 535 (1891).

I. Straussii, Lynch, Book of Iris, p. 1287 (1906) ex parte.

[Hitherto this Iris under one or other of its names has been made synonymous with either *I. chamaeiris*, *I. lutescens* or *I. virescens*, which are themselves all names of the French and Italian species, see p. 149, and cf. Asch. und Grab. Syn. III. pp. 472, 474, 475.]

DISTRIBUTIONS. The Balkans and Southern Hungary.

Banat, East, 18—, Heuffel (V).

Dubova, 1890, Janka (K).

Bosnia and Herzegovina. Mt Trebović (Sarajevo), 1885, Beck (V) [Locus classicus for Beck's *I. bosniaca*].
1893, Fiala (V) (BM), 1897, Fiala (B).

Kajabasa (Travnik), 1889 and 1897, Brandis (K) (E) (B) (V).

Rogatica, 1898, Čurčić (B).

Orijin (Herzegovina), 1899, Čurčić (B).

Velez Planina (Mostar), 1896, Fiala (B).

Montenegro. Hum Orahovski, 1886, Szyszylowicz (V).

¹ Among Foster's MS. notes I find the following entry confirming my identification of the Berlin specimen "93 D (=the 4th plant received in 1893) *I. macedonica* from hills Khortadj, 11 kilometres from Salonica, 1150 m. alt., from Nadji, Salonica.

"Rhizome small, compact, like *pumila*,—is identical with *I. Reichenbach*. (Heuff.)"

- Serbia.* Vranje (Mt Pljackavica), 1896, Adamovic (K) (V) (B).
 1894, Adamovic (B).
 1895, Adamovic (K).
 Mt Basara, 1896, Adamovic (V).
 Vrska-Čuka near Zaječar, 1890, Adamovic (B).
 Pirot, 1892, Jovanovic (V).
 No locality, 18—, Pančić (K).
 1845, Gutch (C).
Bulgaria, 1903, Adamovic (B).
Eastern Roumelia. Stanimaka, 1892, Velenovsky (V).
 1894, Stribrny (E) (P) (K).
 1895, Stribrny (K) (BM) (E).
 1896, Stribrny (E).
 1903, Adamovic (B).
 Sliven (Mt Catalkaje), 1893, Degen (V).
 1893, Wagner (BM).
Macedonia Gul tepe near Kereci koj (Salonika), 1909, Dimonie (E).
 Salonika, 18—, Nadji (B), 1901, Adamovic (V).
 Neochori (Salonika), 1869, Krüper (B).
 Koprulu (Koprili), 1904, Bierback (BM).
 Galatchia, 1892, Nadji (B).
 Mt Rhodope, 1903, Adamovic (B).
 "Ex horto meo," 1877, Janka (V).

Diagnosis.

I. Reichenbachii Pogoniris; *I. chamaeiris* hand dissimilis sed *spathae* plerumque biflorae, valvis acute carinatis.

Description.

Rootstock, a compact rhizome with crowded growths.

Leaves, ensiform, glaucescent, 3—6 in. by $\frac{1}{2}$ — $\frac{3}{4}$ in. at flowering time, increasing in size later, more or less falcate.

Stem, 6—10 in. long, 1-headed, and usually bearing one or two reduced leaves.

Spathes, 1—2-flowered, valves green, or only very slightly scarious, navicular, acutely keeled. $1\frac{1}{2}$ —2 in. by $\frac{1}{2}$ — $\frac{3}{4}$ in.

Pedicel, very short.

Ovary, cylindrical with six grooves.

Tube, 1— $1\frac{1}{2}$ in. long, funnel-shaped.

Falls, obovate-cuneate, with thick beard of close set, short, silky hairs.

(a) Colour a peculiar reddish brown purple, almost chocolate. In this the beard is composed of more or less bluish white hairs.

(β) Colour yellow, sometimes with a tinge of green and with a few brown or purple veins at the base of the segments. Beard orange.

Standards, oblong elliptical, narrowing sharply to a short canaliculate haft, emarginate, of the same colour as the falls.

Styles, a long oval, keeled, either purplish or yellow.

Crests, small, subquadrate, with serrate edge.

Stigma, oblong, entire, prominent.

Filaments, much longer than the anthers.

Anthers, short.

Pollen, cream.

Capsule, a long ellipse with six shallow grooves.

Seeds, pyriform, wrinkled, brown.

Observations.

This Iris has long been a source of confusion because it has not been recognised that just as we find many colour-forms of *I. pumila* and *I. chamaeiris*, so are there also colour-forms of this Balkan Iris. In the various herbarium collections I have seen authentic plants of Janka's *I. balkana* (purple), Beck's *I. bosniaca* (yellow) and Pančić's *I. serbica* (yellow), and moreover I have cultivated all three and raised seedlings of them and I have now not the slightest doubt that *I. balkana* is only the purple form of *I. Reichenbachii*, of which the other two names are synonyms. It has been stated that *I. serbica* grows on limestone and *I. bosniaca* on granite and this may be the case but that is no reason for giving them specific rank.

As herbarium specimens, it is sometimes not easy to distinguish these Balkan plants from *I. chamaeiris*, but the chief differences are to be looked for in the flattened, acutely keeled spathes (those of *I. chamaeiris* are more tubular and only one valve is slightly, if at all, keeled) and in the thin transparent texture of the segments of the flowers (see Plate XXXIV). The yellow flowers are often slightly veined with purple and the purple forms are of that curious, almost chocolate shade, that occurs in another Balkan species, *I. mellita*.





As in the case of *I. chamaeiris*¹, it is not unlikely that some colonies of plants are all of one colour while in others both the purple and the yellow forms occur together. At any rate both forms occur among specimens from Stanimaka.

The cultivation of this species is somewhat easier than that of collected plants of *I. chamaeiris*. As might be expected, the foliage entirely disappears in winter and, as the flowers do not appear until May, they are less liable to suffer than those of the French plant. I have not noticed that they are fastidious as to soil, provided that adequate drainage is provided.

The plants may be lifted and divided soon after the flowers fade and seedlings are easily raised. If planted out in early summer, the young plants should grow to flowering size by the following year, and I have even had one case of a plant of this age that produced no less than thirteen flowering stems.

III. The dwarf Pogoniris of Northern and Eastern Central Asia.

The two species that form this group are distinguished by their closely tufted growth, by the membranous sheaths and fibrous wrappings that enclose the base of the leaves and by the relatively thick root fibres.

- I. Leaves tapering gradually to a point.
- II. Leaves blunt.

I. tigridia (p. 153).

I. Potanini (p. 154).

I. TIGRIDIA

(FIG. 18)

Bunge in Ledebour, Fl. Alt. i. p. 60 (1829).

*Ledebour, Ic. Fl. Ross. t. 342 (1830).

Baker in J. L. S. xvi. p. 144 (1877).

Hdk. Irid. p. 28 (1892).

Maxim. in B. A. P. xxvi. pp. 529 and 537 (1880).

Mél. Biol. x. p. 722 (1880).

Franchet, Plant. David. i. p. 297 (1884).

SYNONYMS.

I. pygmaea, Pallas MS. (BM).

I. pumilae affinis, Pallas MS. (LS).

I. praecox, Pallas MS. (BM).

I. pandurata, Maxim. in B. A. P. xxvi. p. 529 (1880).

DISTRIBUTION. From the Altai Region to Manchuria.

[N.B. Bunge's original plants were found near the river Tscharysch, a tributary of the Obi, which flows north from the Altai Mts.]

Altai Mts, 18—, Bunge (B).

1898, Elwes (K).

Jakutsk, 18—, Turczaninow (SP).

Lake Kosgol, 1880, Potanin (V).

Kiakhta, 1846, Calau (V).

Beyond Lake Baikal, 17—, Pallas (BM) (SP).

Dahuria, 17—, Pallas (BM) (V).

W. Kansu, 1880, Przewalski (K).

1885, Potanin (K) (V) (B).

R. Ingoda, 1836, Fischer (K).

Nertschinsk, 1889, Karo (no. 13 A) (K) (BM)

(B) (V).

Jehol (Chengtehfu), 18—, David, no. 1696(K)(P).

Manchuria, 1889, Ross (K).

Manchuria near the trans-Siberian Railway,
1908, Komarov (BM).

Diagnosis.

I. tigridia Pogoniris; *I. pumilae* haud dissimilis sed foliorum fasciculi confertiores, basi folliculis membranaceis et fibris dense obtecti; folia angustiora, acuminata.

Description.

Rootstock, a slender rhizome with very crowded growths and relatively stout root fibres.

Leaves, 3—6 in. by less than $\frac{1}{4}$ in., strongly ribbed, narrowing gradually to a fine point. Each tuft is sheathed at the base in conspicuously veined or ribbed, membranous sheaths, and surrounded by a few erect fibres.

Stems, 1—3 in. long, 1-headed.



FIG. 18. *I. tigridia* from a herbarium specimen; half the natural size.

¹ See p. 149.

Spathes, 1—2½ in. long, 1—2-flowered.

Pedicel, short.

Tube, short at first but about 1 in. long when the flower is fully expanded.

Falls, bearded, with reflexed blade, either blue purple or yellow.

Standards, blue purple or yellow.

Observations.

This small but very floriferous Iris is not apparently in cultivation. Specimens of it are remarkable for the close growth of the shoots, which are enclosed at the base in white membranous sheaths; the latter are surrounded with the fibrous remains of old leaves. The root fibres are noticeably thick, for such diminutive plants. The only other species with which *I. tigridia* may be confused is *I. Potanini*, which however always has blunt leaves cased at the base in very abundant fibres, while the leaves of *I. tigridia* taper gradually to a fine point. (See Fig. 18, p. 153, and Fig. 19, p. 154.)

There seems to be no good ground for separating *I. pandurata* Maxim. from *I. tigridia*. Maximowicz says (B. A. P. l.c.) that his *I. pandurata* is similar to *I. tigridia* but distinguished by its two-flowered spathes. The only specimens he quotes were gathered by Przewalski in Western Kansu. An examination of plants (K) from this same locality collected both by Przewalski and Potanin show that of seven stems on one plant only one has two flowers, all the others having a single-flowered spathe, while another plant has equal numbers of 1- and 2-flowered spathes. Another noticeable feature is that the perianth-tube lengthens out very late. When the flower buds appear from the spathes the tube is only ¼ in. long but it rapidly grows to as much as an inch in length. Herbarium specimens are therefore apt to be more than usually misleading.

Nothing is known of the cultivation of this Iris but its floriferous character would make it a desirable introduction and it would probably prove to be quite hardy.

I. POTANINI

(FIG. 19)

Maximowicz in B. A. P. XXVI. pp. 528 and 537 (1880).

Mél. Biol. X. p. 721 (1880).

Baker, Hdk. Irid. p. 27 (1892).

SYNONYM.

I. Thoroldi, *Baker in Hook. Ic. Plant. XXIV. t. 2302 (1894).

Baker ex Hemsl. in J. L. S. XXX. pp. 118, 129 and 139 (1894).



FIG. 19. *I. Potanini* from a herbarium specimen, very slightly reduced.

DISTRIBUTION. North-western China and Thibet, where it is found at a height of 17—18,000 feet.

West Kansu, 1886, Potanin (K) (B) (E).

Western China, 1908, Forrest, no. 2404 (K).

Szechuan; between Batang and Litang, 190—, Bonvalot et le Prince Henri d'Orléans (P).

Northern Thibet, 1884, Przewalski (K) (V) (B).

N.E. Thibet; Si-an-si-bei, 1904, Filchner, no. 99 (B).

Central Thibet, 1891, Thorold (K).

1892, Rockhill (K).

18—, Welby and Malcolm (K).

Diagnosis.

I. Potanini Pogoniris; *I. tigridia* valde similis sed folia obtusa.

Description.

Rootstock, even smaller than that of *I. tigridia*, but otherwise of similar growth.

Leaves, 1—3 in. by ½ in., ribbed, with a rounded blunt end, not pointed and tapering as in *I. tigridia*. The membranous sheaths at the base are present but almost concealed in a dense mass of curly fibres.

Stem, 1 in. long, 1-flowered.

Spathes, membranous, 1½—2 in. long.

Tube, slender, becoming gradually wider in the upper part, 1½ in. long.

Flowers, small, bearded, either yellow or purple.

[N.B. Maximowicz apparently knew only the yellow-flowered form but Przewalski, 1884 (K), has a purple-flowered example and so also has Potanin, 1886 (K) (B).]

Observations, see p. 154.

The plant is unknown in cultivation but remarkable as growing at a higher elevation (18,000 feet) than any other known Iris.

IV. The larger European Pogoniris.

There are several reasons which make it almost impossible to give a satisfactory account of the larger members of the Pogoniris group.

In the first place they are among the most decorative of all Irises and have therefore been in cultivation for centuries with all the consequent opportunities for escape and relapse into semi-wild conditions.

In the second place the vitality of the rhizomes is such that they will grow in almost any position and stand journeys that are almost invariably fatal to the more slender and less fleshy rhizomes of the Apogon Section. Their wide distribution has therefore been facilitated.

A few instances will suffice to show the difficulties that are consequently to be encountered and the apparently insoluble problems that are involved.

Let us take first the commonest of all Irises, namely *I. germanica*, which is now so widely distributed all over Europe, and we are at once met by the fact that no specimen of this has ever yet been found so far from some existing or ruined habitation that it seemed unlikely that the plant could be an escape from cultivation. All that we can say—and this statement is only based on the analogy of the behaviour of other species—is that it is probably a native of the shores of the Mediterranean or of some country further south, for nowhere else in the Old World do we find Irises that retain their foliage in winter. The plants of Central Europe such as *I. pumila*, *I. aphylla*, and those of mountainous regions, such as the Balkan *I. Reichenbachii*, do not put forth their new leaves until spring and yet *I. germanica* is never leafless in winter.

If this conjecture is correct, we shall not be led by the presence of at least two forms of *I. germanica* in India to suppose that the species is of Eastern origin. For it is a curious fact that in Kashmir in the neighbourhood of Srinagar that form of *I. germanica* is exceedingly common, which Foster named Kharput after the town in Asia Minor from which he received it¹, while in Khatmandu in Nepal its place is taken by the form which is commonly known in Western Europe by the name of *atropurpurea*. This latter is very widely distributed in the South of France, where it is more common even than the more distinctly blue-purple Iris called by convention in English gardens the type of *I. germanica*. For instance, it grows by thousands on the slopes of the castle hill at Beaucaire opposite Tarascon and at several wayside stations across the Camargue.

In support of the theory that *I. germanica* spread to India and was not distributed thence to us, it must be remembered that the passes of the North-West were for centuries the only high road into India and there are apparently other instances in the flora of Kashmir of plants that can only be importations from the West.

Another puzzle has long been offered us in the wide distribution of a white Iris, to which by the rules of precedence the name of *I. albicans* should be given. It is found in Spain, in the Canaries and has even spread thence into Mexico², but it is also found in Sicily, in Greece, in Asia Minor and even in Persia. In one place on the south coast of France, between Agde and Cette, it has even given its name to a locality, if it be true that Les Onglous is only a local name for Les Ongles, which means Irises by reference to the claws of the segments. At any rate, this Iris grows there in millions and is used to hold together the sand banks that surround the vineyards which cover the low ground down to the actual shore of the Mediterranean. Local floras name the plant *I. florentina* but an expedition to the locality showed at once that it is *I. albicans*.

Plate XXXV shows this *I. albicans* side by side with a recent introduction under the name of *I. Madonna*, which was said to come from Arabia (see also p. 162). When I watched the two plants developing in my garden, I could not help thinking that they were only colour varieties of the same species and this supposition was confirmed by the discovery in the Paris herbarium of specimens of both that were found growing together on a mountain in the Yemen in Arabia as long ago as 1837³.

This discovery and the fact that *I. albicans* is the common ornament of Mahomedan cemeteries gave the solution of the puzzle and we see now that the wide distribution of *I. albicans* is due to the fact that the Mahomedans took it everywhere with them as a sacred plant or at least as a conventional ornament for graveyards.

These few instances indicate sufficiently some of the difficulties encountered in dealing with this section of the Iris genus. These difficulties are further increased by the fact that what appear to be species of Pogoniris are not nearly so widely separated as the Apogon species. The best proof of this

¹ This is also the Iris which was planted on the monument to the Officers of the Guards' Brigade who fell at Inkerman but it is not known whence the plants were obtained.

² Cf. Sierra Madre, Mexico, 19—, Rose (W).

³ A letter from Sprenger, dated April 17, 1896, when he was still employed by the firm of Dammann and Co., of San Giovanni a Teduccio, records the first flowering of both the blue and the white forms, which had been imported from the Yemen. (Foster MS.)

is to be found perhaps in the seeds. Each Apogon Iris, with scarcely an exception, can be distinguished by its seeds alone, but among the Pogoniris there are only three or four types of seeds, each possessed by several species.

In addition, it is remarkable that very few examples of mature capsules of seed of Pogoniris are found in herbarium collections. Of Apogon species specimens in the fruiting stage are much more common and I believe that this is due to the fact that most Apogons are so constructed that self-fertilisation is almost inevitable (see also p. 13), while the Pogoniris type needs the intervention of some external agency.

The consequence of this absence of the capsules is that the identification of herbarium specimens of Pogoniris is often difficult and sometimes impossible. Without herbarium specimens it is impossible to define the limits of the distribution of any species, if the same plan is followed here that has been adopted in dealing with the other sections¹. If therefore the account of some of the following species seems lamentably incomplete, my only plea is the lack of material on which to base any more adequate statement.

Several specific names, e.g. *neglecta*, *flavescens*, *sambucina*, etc., are only retained here because they are in common use and serve to indicate certain types of garden hybrids. Their retention must not be taken as an admission of their claims to specific rank.

For the very reason that these Irises are in general tenacious of life and easily cultivated, they often suffer from neglect or are relegated to positions where they may linger on but in which they obtain neither enough nourishment nor enough sun to enable them to flower.

Two things they must have to do well, sun and a well-drained soil. If the former fails to reach the rhizomes, growth may be luxuriant though the flowers will be few, while in soil in which the water level is near the surface, the root fibres will be found to rot off, instead of spreading in the soil.

On the whole, I am inclined to think that all Pogoniris do really best in heavy soil, always provided that the drainage is good. In light soils, the difficulty is to feed the plants without introducing disease, which is apt to be conveyed by the use of farmyard manure. If left to themselves, in the course of a few years they will have exhausted the soil within reach of their root fibres and will then dwindle, unless they are fed in spring by top dressings of leafsoil and a complete artificial manure. In richer, heavier soil, on the other hand, they can remain longer in the same position without exhausting the available food supply, though even here light dressings of artificial manure tends to improve the plants. To obtain the requisite drainage, heavy soil should be thrown up into mounds or ridges or at any rate arranged in sloping beds so that most of the moisture runs off before it has time to sink into the ground.

Transplantation should always be carried out as soon after flowering as possible and the plants will then become so well established in their new quarters before the winter that they are able to flower perfectly in the following year. The rhizomes must not be deeply covered but kept level with the surface of the ground and the leaves should never be cut off until they come away easily with the slightest pull.

Notes on the diseases to which these plants are liable and on the remedies for them will be found at p. 16.

The species contained in this group may be separated as follows:

I. Spathes green either wholly or in part at flowering time.

- | | |
|---|---|
| i. Stem branching at or below the middle. | <i>I. aphylla</i> (p. 157). |
| ii. Stem branching above the middle. | |
| (a) Spathes not at all scarious at flowering time. | <i>I. variegata</i> (p. 159). |
| (b) Spathes green below, scarious in the upper part; flowers almost sessile on the stem. | <i>I. albicans</i> ² (p. 161). |
| (c) Spathes flushed with purple, scarious in the upper half; the lateral flowers on peduncles of some length. | <i>I. germanica</i> (p. 162). |

II. Spathes wholly scarious at flowering time.

- | | |
|---|-------------------------------|
| i. Spathes silvery-white; seeds compressed. | <i>I. pallida</i> (p. 167). |
| ii. Spathes pale brown scarious; seed globular. | <i>I. Cengialti</i> (p. 168). |

III. The following plants are probably of hybrid origin. The spathes are more or less scarious and the inflorescence either resembles that of *I. germanica* (see Fig. 21, p. 163) or is slightly more complicated.

- | | |
|--|---|
| (1) Standards white, falls blue. | <i>I. amoena</i> (p. 169). |
| (2) Flowers wholly yellow; leaves short and of a very yellow green when young. | <i>I. flavescens</i> (p. 169). |
| (3) A dwarf <i>germanica</i> with almost uniform dark red-purple flowers. (Plate XXXVI.) | <i>I. Kochii</i> (? <i>I. aphylla</i> × <i>I. germanica</i>) (p. 170). |

¹ Throughout the book, the statements in local floras are neglected and the account of the distribution of each species is based only on specimens seen and recorded. (See also p. 1.)

² Although this plant probably comes from Arabia (see p. 155), yet it seems to have more affinity with European than with Asiatic species.

- | | |
|--|--|
| (4) Segments of a murky chocolate purple on a yellow ground; plant dwarf. | <i>I. lurida</i> (p. 171). |
| (5) Standards pale blue purple, falls deeper blue purple. | <i>I. neglecta</i> (? <i>I. pallida</i> × <i>I. variegata</i>) (p. 172). |
| (6) Standards smoky yellow and blue purple, falls veined with blue purple. | <i>I. sambucina</i> (? <i>I. pallida</i> × <i>I. variegata</i>) (p. 172). |
| (7) Standards smoky yellow and red purple, falls veined with red purple. | <i>I. squalens</i> (? <i>I. pallida</i> × <i>I. variegata</i>) (p. 172). |

†† *I. APHYLLA*

Linn. Spec. Plant. ed. 1. p. 38 (1753).
 Asch. und Graebn. Syn. III. p. 476 (1906).

SYNONYMS.

[N.B. The names are grouped in chronological order since it is impossible in many cases to say to which of the forms of a polymorphous species they were applied.]

I. biflora, Linn. Spec. Plant. ed. 1. p. 38 (1753) ex parte. See Observations.

I. biflora, Pallas, Iter. 1. p. 171 (1771).

[N.B. Pallas' specimen named *I. biflora* (BM) is certainly *I. aphylla*, but see Link Jahrb. i. III. p. 71 (1820) where Willdenow is quoted as describing an altogether different plant.]

I. nudicaulis, Lam. Encycl. III. p. 296 (1789).

I. bohémica, Schmidt, Fl. Boëm. inch. Cent. IV. p. 5 (1794).

I. extrafoliacea, Mikan in Pohl, Tent. Fl. Boh. 1. p. 47 (1810).

I. hungarica, *Walld. and Kit. Plant. rar. Hung. III. p. 251, t. 226 (1812).

*Sweet, Brit. Flow. Gard. vol. II. t. 118 (1825).

I. furcata, Bieb. Fl. Taur.-Cauc. III. p. 42 (1819).

I. falcata, Tausch in Roem. and Schult. Mant. 1. p. 369 (1822).

I. furcata, *Bot. Mag. t. 2361 (1823).

I. furcata, *Lindley, Bot. Reg. t. 801 (1824).

I. Fieberi, Seidl. in Opiz, Naturalien. p. 128 (1823).

Oek. Tekt. Flora Bohm. p. 66, no. 48 (1836).

" var. *monantha*, Schur. Enum. pl. Transs. p. 655 (1866).

I. breviscapa, Opiz, Naturalien. x. p. 191 (1825).

I. bisflorens, Host, Fl. Aust. 1. p. 46 (1827).

I. Clusiana, Tausch in Flora XII. i. Ergänzt. p. 49 (1829).

I. reflexa, E. Berg in Flora XVI. 1. Beibl. p. 33 (1833).

I. biflora, *Sweet, Brit. Fl. Gard. Ser. II. vol. II. t. 152 (1832).

I. nudicaulis, *Rchb. Icon. x. t. CCCXXXI. fig. 758 (1847).

I. biflora, *Rchb. Icon. x. t. CCCXXXII. fig. 759 (1847).

I. Fieberi, *Rchb. Icon. x. t. CCCXXXIII. fig. 760 (1847).

I. rigida, Fieber ex Klatt in Linnaea XXXIV. p. 598 (1866).

I. subtriflora, Fieber ex Klatt in Linnaea XXXIV. p. 599 (1866).

I. nudicaulis, *Hooker f. in Bot. Mag. t. 5806 (1869).

I. bifurca, Steven MS. ex Baker in J. L. S. XVI. p. 145 (1877).

I. Schmidtii, Hort. ex Baker in J. L. S. XVI. p. 145 (1877).

I. benacensis, A. Kerner ex Stapf in Verh. Zool.-bot. Gesell. Wien. XXXVII. p. 649 (1887).

I. Polonica, Blocki ex Aschers. und Graebn. Syn. III. p. 478 (1906).

DISTRIBUTION. From Bohemia and Silesia through Hungary to Southern Russia and the Caucasus. It is never found east of the Volga (see Pallas Iter. l.c.).

Bohemia. Lobositz, 1844, Reichenbach (K) (V).

Prague, 1848, Bayer (V).

Teplitz, 1853, Winkler (V).

Tetschen, 1858, Malinsky (V).

Silesia. Breslau (Koltwitz), 18—, Krausse (V).

Hungary. Hermannstadt, 1850, Kotschy (V).

18—, Fuss (K).

Langenthal, 1878, Barth (V).

Tokay, 18—, Hb. Joad (K).

Kolosvar, 1901, Richter (E).

Russia. Kursk, 1860, Augustinowicz (BM).

1863, Lindemann (V).

R. Terek, 1881, Brotherus (BM).

Elizabethgrad, 18—, Prescott (C).

[N.B. This specimen has two flowers in the spathe as well as a lateral stem, thus showing that Bieberstein's statement as to the number of flowers on the Caucasus plant was erroneous, see p. 159.]

Elizabethgrad, 1864, Lindemann (V).

Mt Beschtai, 1842, Hohenacker (BM) (V) (C) (E).

Caucasus; Temir-khan-shura, 1910, Meyer (HortD).

Diagnosis.

I. aphylla Pogoniris; *folia* ensiformia, plerumque falcata; *caulis* foliis subaequalis, infra medium vel etiam basi ramosus; *spathae* herbaceae, purpureo plerumque suffusae; *segmenta* exteriora pilis apice coerulescentibus, basi luteis barbata.

Description.

Rootstock, a compact rhizome.

Leaves, ensiform, more or less glaucous, the outermost of each tuft being usually falcate; the non-flowering tufts are usually as long as or longer than the stem; withering entirely away in autumn and not shooting again until the spring.

Stem, 8—15 inches high, branched below the centre. The point of attachment of the lower lateral to the main stem is often at the ground line so that two stems appear to rise side by side. In some weak plants the lateral branch from the base does not develop.



FIG. 20. Inflorescence of *I. aphylla*, much reduced, showing a lateral stem arising at the ground line.

Spathes, green or flushed with purple, usually somewhat inflated and membranous and only slightly scarious in the upper part, 1—2-flowered.

Pedicels, very short.

Ovary, short, oblong.

Tube, $\frac{3}{4}$ —1 in. long, green, more or less flushed with purple.

Falls. The obovate blade passes without any marked constriction into the tapering wedge-shaped haft. The colour is purple, either of a blue or red shade, and the beard, which is often very straggling, is in front white more or less distinctly tipped with blue. In the centre the blue tips are absent and at the base the hairs become yellow. 2—2½ in. by 1—1¼ in.

Standards, the obovate or suborbicular blade narrows abruptly to the narrow, channelled, brown veined haft. The colour is nearly the same as that of the falls but sometimes of a slightly paler shade. 2—2½ in. by 1¼—1½ in.

Styles, keeled, oval or triangular.

Crests, triangular, usually with serrate edge.

Stigma, entire.

Filaments, colourless or flushed with blue purple.

Anthers, cream or cream edged with blue purple.

Pollen, white or bluish.

Capsule, rounded trigonal, tapering, with more or less distinctly marked grooves at the angles and on the sides.

Seeds, globose or slightly pyriform, dark brown or red brown, wrinkled.

Observations.

An examination of Linnaeus' account of two of his species, namely *I. aphylla* and *I. biflora*, and of the authorities on which his statements are based seems to show that he did not clearly distinguish two widely separated plants.

I. aphylla is described by Linnaeus as a bearded Iris, having a many-flowered bare stem of the same length as the leaves¹. This description is quoted from Royen's *Florae Leydensis Prodomus*, p. 17 (1740), which in turn quotes C. Bauhin's *Pinax*, p. 32 (1623). The latter refers to Clusius' *History of Pannonian Plants* (1583) *Iris VII caulifera purpurea* 1 and 2². Clusius as usual makes it quite clear to what plant he is referring by the statement that it is leafless in winter³. That this Central European plant was known to Linnaeus is proved by the specimen in the Linnaean Herbarium at the Linnaean Society, although it is there named *I. biflora* and not *I. aphylla*. No locality is given either with this specimen or in the literature.

Linnaeus' name, *I. biflora*, is based on plants in the *Hortus Upsaliensis*, p. 17 (1748), *Hortus Cliffortianus*, p. 19 (1737), and in C. Bauhin's *Pinax*, p. 33 (1623). In all three descriptions there occurs the phrase "on rocks near the sea in Portugal" and in the first two the name is explained as meaning that the plant flowered twice in the year. The source of this information is to be found in Clusius, *Hist. Hisp.* p. 221 (1576), where Clusius describes a plant which he found flowering in November on the rocks near Coimbra and named somewhat inappropriately *I. biflora* for the reason just given. No direct citation of this passage of Clusius can be traced but there can be little doubt that this is the origin of the descriptions in pre-Linnaean literature.

This Portuguese plant is the *I. subbiflora* of Brotero and it is obvious that Linnaeus confused it with the Central European *I. aphylla*, for not only did he name his herbarium specimen of the latter *I. biflora*, but he also quotes in his description of *I. biflora* C. Bauhin, *Pinax*, p. 33, who refers to

¹ *Iris corollis barbatis, scapo nudo longitudine foliorum multiflora*, Linn. l.c.

² Not *Iris VII et caulifera*, which is a misquotation.

³ *Peculiarem habet notam ut nulla folia per hiemem retineat, sed omnia flaccescant et exsiccantur*, Clusius l.c. p. 249.

⁴ *In rupibus maritimis Lusitaniae*.

Chamaeiris latifolia in the Hortus Eystett. vern. viii. i. (1613). The figure there given is undoubtedly *I. aphylla* and not the Portuguese plant, which is depicted at vi. ii. under the name of *I. portugalia*.

Since, therefore, Linnaeus' name of *I. biflora* is based on a confusion between the Portuguese and the Central European plants, it seems not unreasonable to reduce it to a synonym partly of his own *I. aphylla* and partly of the *I. subbiflora* of Brotero.

I. aphylla is a most variable species, in dealing with which I have not ventured to separate any varieties. It is impossible to do this with certainty from the written accounts, for most of the descriptions of the synonyms given above omit the differentiae, which separate the plant in question from those already known. It is likewise impossible to rely on herbarium specimens, for differences in the foliage, in colour, in character of the spathes or in the formation of the ovary are seldom visible in such material and seed-vessels are usually entirely absent.

All that can be done at present is to define *I. aphylla* as the only known European species of Iris with bearded flowers and a stem that branches below the middle, often at the very ground line (cf. Fig. 20, p. 158). Its habitat extends from Bohemia in the west to the Caucasus in the east.

The only satisfactory means of defining and correlating the various forms of this species would obviously be to grow side by side and under similar conditions either collected plants or even preferably plants raised from seed from known localities. Such a task can only be undertaken with the help of botanists familiar with the range of the species and it is to them that I should like to appeal for help in the matter. It is not enough to know the appearance of the wild plant, for different conditions of soil and environment are capable of producing such marked changes in the plants, that apparent differences in nature may be only accidental and disappear when the plants are removed to identical conditions. As an instance, we may take the case of the *I. furcata* of Bieberstein, the Caucasus representative of *I. aphylla*. In the wild state, as Bieberstein¹ noticed and as was shown by withered stems still attached to rhizomes sent to me from the Caucasus, the flowers are few in number. In cultivation, however, in garden soil, where the struggle for existence is less keen, the inflorescence at once became more complex and the flowers more numerous.

In their synopsis of the Central European Flora Ascherson and Graebner have divided the species into the three main headings *typica*, *Fieberi*, and *hungarica*, under which they have attempted to group the numerous synonyms. Their typical plant has a hexagonal ovary, while *Fieberi* and *hungarica* are said to agree in the possession of trigonal ovaries and to differ chiefly in that *hungarica* has a slightly longer tube in comparison with *Fieberi*.

The existence of numerous intermediate forms seems to suggest that we should await the results of further cultivation and comparison of living material, bearing all the time in mind that it is not impossible that we may be dealing with a series of different combinations of Mendelian characters. In the latter case two courses are open to us, either to name every variety however slightly it may differ from others or to determine the limits of the species and merely define it so as to exclude other species and to admit every possible combination of the characters involved. For practical purposes the latter course seems preferable.

A plant that is often found in gardens under the name of *I. gracilis*, with the characteristic branching stem of *I. aphylla* and flowers of a pale yellowish or greyish white irregularly splashed with purple, is presumably an albino form of this species. It can scarcely be called ornamental but it is very free flowering and sweetly scented.

After seeing Dr Stapf's original specimens of *I. benatensis*, now at the University of Vienna, I have come to the conclusion that the plant, which is fairly common in gardens under that name, is true and that it is only one more form of *I. aphylla*, distinguished by the long, narrow spathes, heavily streaked with red purple. The falls are narrow, strap-shaped, of a rich red purple, with a dense beard of white hairs slightly tipped with blue in front and with yellow behind.

The cultivation of *I. aphylla* is of the easiest. Like other Central European Irises, it loses its leaves entirely for some months in winter and is accordingly very hardy. The plants grow rapidly and must therefore be shifted or at least be provided with fresh soil at intervals of about three years. Transplantation should take place immediately the flowers have faded.

†† *I. VARIEGATA*

Linn. Spec. Pl. ed. t. p. 38 (1753).

*Jacquin, Fl. austr. i. t. 5 (1773).

*Bot. Mag. t. 16 (1787).

*Red. Lil. v. t. 292 (1809).

*Rehb. Icon. cccxxxiv. fig. 761 (1847).

Baker in J. L. S. xvi. p. 145 (1877).

Hdk. Irid. p. 34 (1892).

Asch. und Graeb. Syn. iii. p. 48 (1906).

¹ Cf. Bieb. Fl. Taur.-Cauc. iii. p. 42 (1819) "variat caule unifloro."

N.B. The following are probably forms of *I. variegata*:—

I. leucographa, Kerner in OBZ. XIII. p. 313 (1863). This appears to be an albino form of *I. variegata*, in which the purple veining is replaced by white. It was only found once by Kerner at Rákos, near Buda Pest. He searched again in the same spot, which he also showed to Dr A. v. Degen, but the plant has never been discovered again. The place, where it grew, has now been built over.

I. lepida, Heuffel in Flora XXXVI. p. 621 (1853), collected in 1842 in the neighbourhood of Grebenac in Banat with inflated herbaceous spathes and white flowers with violet-veined falls is probably a form of *I. variegata*. It has, however, never been found again since its first discovery and it is impossible to identify it with any certainty. It is sometimes stated, though on what authority I do not know, that Reichenbach's figure of *I. lurida* (Ic. IX. CCCXXXVII. fig. 764) was taken from a flower of Heuffel's plant but it does not tally with the description. It rather represents one of the smoky purple forms, which have been known under the names of *I. sambucina* and *I. squalens* and which are probably all hybrids of *I. pallida* and *I. variegata*. See also *I. amoena* (p. 169).

DISTRIBUTION. From Austria and Western Hungary through the Balkan States.

Austria. Vienna; Sievering, 1835, (K).

1841, Kovats (K) (V).

1853, Leithner (B).

1874, Halacsy (B).

Am Himmel, 18—, Kovats (V).

Salzburg, 18—, Pichlmayer (V).

Moravia; Brünn, 1861, Makowsky (V).

Hungary. Buda, 1838, Lang (K) (C).

1827, Bauer (K).

18—, Hb. Schiffer (C).

18—, Sadler (V).

Ofen; Wolfsthal, 1845, Gerendayer (E) (V).

Schemnitz, 1884, Kmet (B).

1892, Kmet (V).

Matra, 18—, Sadler (V).

Transylvania, 1862, Pavai (BM).

Langenthal, 1898, Barth (E).

Banat; Deliblat, 1887, Degen (V).

Croatia. Zengg, 1870, Pichler (K).

Slavonia. Mitrowitz, 1871, Godra (K).

Servia. Zajecar, 1896, Adamovic (V).

Kladovo and Rokovica, 1909, Belgrade Botanic Garden (HortD).

Bulgaria. 1901, Stribny (E).

Rumelia. 1846, Hb. Noeanum (K).

Dobrukscha. 1873, Sintenis (K).

Tultscha, 1872, Sintenis (B).

N.B. There is at Berlin a specimen from Meersburg collected by Busch in 1883 and, if this is the Meersburg on the opposite side of the Lake to Constance, we get a considerable westward extension of the habitat of this species.

Diagnosis.

I. variegata Pogoniris; *folia* tenuia, conspicue striata; *caulis* ramosus; *spathae* herbaceae, inflatae; *segmenta* interiora lutea, exteriora purpureo venosa.

Description.

Rootstock, a compact rhizome.

Leaves, deep green, distinctly ribbed; those clothing the base of the stem are more or less falcate and not more than 8 in. long; those of the non-flowering shoots are longer and more erect.

Stem, 15 in. or less, bearing a terminal head of 3 flowers and 2 or 3 side branches, set in bracts and bearing each 2 flowers. In weak specimens the stem is sometimes unbranched and bears only two flowers in the single terminal head.

Spathe valves, 1—1½ in. long, the inner valve being usually longer than the outer; light green, glossy, sometimes slightly flushed with purple and membranous only at the extreme edge, inflated.

Peduncel, very short.

Ovary, ⅜ in. long, with six longitudinal grooves at equal intervals.

Tube, ⅜ in.

Falls. The obovate blade passes gradually without any constriction into the wedge-shaped haft. The yellow-white ground is veined with conspicuous purple or black-purple veins. In some specimens these run together on the outer part of the blade, of which the extreme edge is, however, often quite pale. The beard is of close set yellow or orange hairs, sometimes tipped with brown.

Standards, rounded oblong with a short canaliculate haft, which together with the lower part of the blade is usually slightly veined with brown. The rest of the blade is bright yellow.

Styles, narrow, yellow, keeled.

Crests, long, narrow, pointed.

Stigma, entire, rounded.

Filaments, longer than the anthers.

Anthers, cream.

Pollen, cream.

Capsule, 1 in. long by $\frac{1}{2}$ in. broad, with six grooves.

Seeds, small, greyish-brown, more or less pyriform.

Observations.

This Iris is so distinct that it has not been described under any other name and it is probably the only Linnaean species of Iris to enjoy this distinction.

In Pre-Linnaean literature this Iris may be traced back through the Hortus Cliffortianus¹ and C. Bauhin's Pinax to Clusius' History of Pannonian plants. Clusius there relates (p. 245, iv. *I. varia caulifera*) that he first found the plant growing near Stampfen, which is not far from Pressburg in Western Hungary.

In its wild state this Iris is distinctly smaller than the common forms of *I. germanica* and varies slightly in colour. My specimen from Kladovo has light red brown veining on the falls and the green spathes are slightly flushed with purple. In another plant from Rokovica in Servia, the veining is of a dark black red and the spathes are quite green without any purple flush. The pale edge of the falls, which is noticeable in some wild specimens, becomes even more pronounced and conspicuous in some garden forms. For the numerous hybrids of this species, see p. 234.

Cultivation is extremely easy and the plants are perfectly hardy as is always the case with those species which lose their leaves in autumn and remain dormant until spring.

† *I. ALBICANS*

(PLATE XXXV a)

Lange in Kjoeb. Vidensk. Meddel. 1860, p. 76.

Pugillus, i. p. 76 (1860).

*Pl. Nov. Hisp. t. 33 (1864).

Willk. et Lge. Prodr. fl. hisp. i. p. 143 (1861).

SYNONYMS.

I. florentina, Lam. Encycl. III. p. 293 (1789).

*Red. Lil. t. 23 (1802).

*Tratt. Auswahl, no. 85 (1821).

Kunze in Flora XXXIX, p. 692 (1846).

Kohler, Mediz.-Pflanz. i. 1887.

? *I. alba*, Savi, Fl. pis. i. 32, 1798.

[N.B. This is probably, but not certainly, *I. albicans*. It might conceivably be *I. germanica* var. *florentina* or some other albino form of *I. germanica*.]

+ Var. *Madonna*.

SYNONYM.

I. Madonna, Hort. Sprenger ex Bull. Soc. Tosc.ortic. XVII. p. 130, 1892. (PLATE XXXV β 1)

DISTRIBUTION. The specimen from which the species was first described by Lange was obtained from the neighbourhood of Almeria in 1851 and flowered in cultivation at Copenhagen in 1858. The probability however is (see p. 155) that the plant is really a native of the Yemen in Arabia and that it has been widely distributed by the Mahommedans wherever they have gone. It is used by them as a decoration in their graveyards.

Yemen. Mt. Saber, 1857, Botta (P), white and blue forms.

Spain. Murcia, Sierra de la Fuensanto, 1852, Bourgeau (K) (E).

Puerto de Santa Maria, 1849, Bourgeau (K) (O).

Canary Isl.; El Monte, 18—, Hb. Lowe (K).

Barrano de la Virgen, 1846, Bourgeau (K).

Teneriffe, 1910, Perez (HortD).

France. Les Onglous (Hérault), 1911, Dykes (HortD)?

Crete. Souda Bay, Megalon Kastron, 1846, (B).

Cyprus. Prodromo, 1862, Kotschy, no. 888 (V).

No locality, 1885, Kenyon (Foster MS.).

Asia Minor. Smyrna, 1893, Whittall (Foster MS.).

Diagnosis.

I. albicans Pogoniris; *I. germanicae* haud dissimilis sed *caulis* robustior, ramis brevioribus; *spathae* minus scariosae; *segmenta* interiora nunquam barbata.

Description.

Rootstock, a stout, compact rhizome.

¹ Linnaeus' caule altitudine caulis multiflori in Spec. Plant. ed. 1. is a misquotation for "foliis altitudine caulis multiflori."

² See p. 155.

Leaves, ensiform, glaucous, somewhat wider than in *I. germanica*, thicker and more rigid; often twisted when full grown.

Stem, about 15—18 inches high; the inflorescence resembles that of *I. germanica* (see Fig. 21, p. 163) but the lateral flowers are more closely set on shorter branches, which are almost entirely concealed in broad, green bracts. The terminal head sometimes contains three flowers.

Spathe valves, navicular, broad, green, hardly scarious at all, or only in the upper third, when the first flowers open. $1\frac{1}{2}$ in. long.

Pedicel, very short.

Ovary, trigonal, with a slight groove on each face. $\frac{3}{4}$ in. long.

Tube, equal to, or slightly longer than, the ovary.

Falls. Blade obovate, half wedge-shaped; the latter bears faint greenish yellow veins on a white ground, which do not extend on to the pure white blade. The beard consists in front of white hairs tipped with yellow and at the back of deep yellow hairs.

Standards. The pure white blade of a rounded oblong shape narrows suddenly to a short canaliculate haft, which bears no hairs and which is faintly veined with yellow.

Styles, almost oval, white, keeled.

Crests, narrow, pointed, with a serrated outer edge.

Stigma, entire.

Filaments, white, about equal in length to the anthers.

Anthers, cream.

Pollen, cream.

Capsule,

Seeds,

[N.B. The variety *Madonna* only differs from *I. albicans* in its blue colour and in the purple-flushed spathes. See Plate XXXV.]

Observations.

If the explanation be correct that I have put forward (see p. 155) as to the origin of this Iris and as to the cause of its wide distribution, then it is one of the few cases in which the albino form of an Iris has been described and named before the coloured form. In spite of this it seems best to classify *I. Madonna* under the same heading as *I. albicans* in order to avoid the multiplication of specific names.

I. albicans is fairly common in cultivation but often misnamed either *I. florentina* or *I. germanica alba*. Both the latter are, I have no doubt, albino forms of varieties of *I. germanica* and *I. albicans* can easily be distinguished from them by the following characteristics:

(i) The inflorescence of *I. albicans* is much more compact and the branches much shorter. (Contrast Plate XXXV with Plate XXXVI and Fig. 21, p. 163.)

(ii) The foliage is stiffer, broader and usually slightly twisted, when full grown.

(iii) The absence of any hairs on the inner side of the base of the standards.

(iv) The shape of the segments and especially of the falls, which in *I. albicans* appear pointed, though they are not really so when flattened out.

The variety *Madonna* is perhaps not yet quite acclimatised in England and still needs a warm sunny position to do well.

† *I. GERMANICA*

Lin. Spec. Pl. ed. 1. p. 38 (1753).

*Plenck, Icones t. 34 (1788).

*Bot. Mag. t. 670 (1803).

Baker in J. L. S. XVI. p. 146 (1877).

Hdk. Irid. p. 37 (1892).

SYNONYMS.

I. spectabilis, Salisb. Prod. p. 43 (1796).

I. vulgaris, Pohl, Tent. Fl. Boh. 1. p. 46 (1810).

I. violacea, Savi, Bot. Etrusc. II. p. 9 (1815).

I. nepalensis, Wallich, Cat. no. 5050 in *Lindl. Bot. Reg. t. 818 (1824) non Don.

DISTRIBUTION. All the known forms of this Iris have been found growing either in semi-cultivated conditions or in such positions that they might easily have escaped from cultivation. No undoubtedly wild specimens are known. The behaviour of the plants in winter seems to show that the species is native to regions with mild winters, for all the known species that are natives of localities, where there is much frost or snow in winter, die down completely in autumn and their leaves do not grow again until the winter is over. Moreover, late frosts in March and April are capable of killing the rudimentary stems of *I. germanica*, when they are only an inch or two in length and entirely concealed in the wrapping leaves. At the same time and under the same conditions, buds of the Central European species such as *I. pumila*, *I. aphylla* and *I. pallida* are entirely unharmed.



Diagnosis.

I. germanica Pogoniris; *caulis* sesquipedalis vel etiam longior, ramosus (v. Fig. 21, p. 163); *spathae* plerumque purpureo suffusae, basi tantum herbaceae, apice scariosae; *segmenta* interiora plerumque barbata.

Description.

Rootstock, a stout rhizome, much branched in good soil but often growing straight ahead unbranched when starved, for the lateral buds are then unable to develop.

Leaves, ensiform, glaucous, 1—1½ ft. by 1—1½ in. when full grown and attaining about half this size before the winter.

Stem, about 2 ft. long, usually bearing four (but sometimes five) flowers. The typical inflorescence consists of a terminal head of two flowers and one short, and one longer, lateral branch, each producing a single flower. A second short lateral branch sometimes occurs, producing the fifth flower (cf. Fig. 21).

Spathes, 1½—2 in. long, scarious in the upper half and more or less flushed with purple.

*Pedice*l, very short.

Ovary, trigonal, not much shorter than the tube.

Tube, about ¾—1 in. long.

Falls. The obovate blade narrows gradually to the wedge-shaped haft, which bears thick veins on a pale ground. The beard consists of white hairs tipped with yellow in front and tends to become almost wholly yellow at the base.

Standards, obovate with a short, channelled haft, which often bears a few straggling whitish hairs.

Styles, broad, keeled, pale at the edges and usually more deeply coloured along the centre.

Crests, triangular, divergent.

Stigma, entire.

Filaments, white, sometimes tinged with pale mauve.

Anthers, cream.

Pollen, white.

Capsule, trigonal, tapering to point above, where it dehisces, thick walled, 1½—2 in. long.

Seeds, pyriform or oval in outline, not compressed, dark red brown, wrinkled.

Varieties of I. germanica.

The following is a list of some of the best known forms of *I. germanica*.

†Var. *vulgaris*. This name is suggested instead of "typica" because it is impossible to say which of the many forms was that described by Linnaeus. The commonest form in England has standards of a distinctly blue purple and falls of a slightly redder shade. The beard is almost white in front, though the yellow tips to the hairs become conspicuous behind.

†Var. *nepalensis* (also called Purple King in gardens).

SYNONYMS.

I. nepalensis, Wallich; Khatmandu, Nepal, 1910, Manners Smith (HortD).

I. germanica var. *atropurpurea* in gardens.

The standards and the falls are of a uniform red purple, the colour of the falls being darker and almost a black purple. This form is very similar to *I. Kochii* except that the stems are slightly taller, and that the light ground and veining of the haft of the falls extend further on to the blade. The leaves also are distinctly larger than those of *I. Kochii*. The beard is bluish white in front but tipped with orange behind.

This variety is common in Nepal and a number of plants of it were very kindly sent to me by the British Resident at Khatmandu, Col. Manners Smith, V.C.

†Var. *Fontarabie*. This is rather a dwarf form with comparatively large flowers. The standards are more distinctly blue than in the common variety and the beard is of a much deeper and brighter yellow colour.

†Var. *Kharput*. This was named after the town in Northern Mesopotamia from which it was sent to Foster. The plant is also common in Srinagar in Kashmir and its origin is therefore extremely uncertain.

It is a well marked form, distinguished from most of the other varieties by the red edged leaves. This edge is conspicuous when the leaves are young but gradually fades with age. The segments are long and comparatively narrow, the standards being very flimsy and weak, of a pale reddish purple and the falls of a deep, black-red purple.



FIG. 21. Typical inflorescence of *I. germanica*, much reduced.

†Var. *Sivas* (Nicholson, Dict. Gard. Suppl. II. p. 447 (1900)). This variety was received by Foster in 1884 from Northern Asia Minor mixed with *I. Biliotti* (MS.). It is distinguished by the weak, yellow green, narrow leaves and by the distinctly blue flowers. The ground colour of the haft of the falls is a faint blue and not white, so that the brown veining is less conspicuous. The beard is only slightly tipped with yellow far back on the haft and therefore appears whiter than in the other varieties.

†Var. *Amas* (syn. *macrantha*). Rhizomes of this form were sent to Foster in 1885 from Amasia in Northern Asia Minor. It is the sturdiest, though not the tallest, of all the *germanica* forms and one of the most distinct, for its leaves remain quite short in winter, behaving in fact more like those of *I. pallida*. The tube is 1 in. long and thickly covered with broken purple streaks; the spathe valves become very nearly wholly scarious by the time the flowers expand. The standards are almost orbicular of a very light blue purple and bear a few scattered yellow tipped hairs on the deeply channelled haft. The falls are of a deep blue purple with a broad beard of bluish white hairs tipped with orange.

Var. *australis*.

SYNONYM.

I. australis, Todaro, Nuov. Gen. e Spec. III. p. 49 (1861).

Lojac.-Pojero, Fl. sicula III. p. 70 (1909).

(Foster MS.) mentions a letter from Todaro received on May 5, 1880, in which it was stated that the plant had not been found spontaneous in Sicily but that it came true from seed repeatedly. Another note mentions that Foster had another plant obtained by Barr from Portugal, which seemed identical with *australis*, except that it grew "rather taller both in leaf and in flower." The falls are described as being distinctly veined, the colour being deeper in the centre. The standards are similar in colour and of a deep reddish purple.

[N.B. I am inclined to believe that this plant must be identical with *I. Kochii*, Kerner. As, however, there is no direct evidence and as the name *I. Kochii* is so well-established in gardens, it seems better to make no change in the names.]

†Var. *Askabadensis*. This plant has been recently introduced into our gardens from Askabad by Mr C. G. Van Tubergen, Junr., of Haarlem. It is a late flowering and very distinct form of *I. germanica*. Its colouring is not unlike that of the variety *Amas* except that the shade of the pale blue standards is somewhat lighter while that of the falls is both paler and slightly more red. The yellow brown veining on the haft of the falls is slight and inconspicuous as is also that on the haft of the standards, which bears a few yellow tipped hairs. The beard is largely tipped with yellow even at the apex and becomes wholly orange at the base.

The whole plant is more slender than *Amas* and the flowers distinctly smaller. In my experience it has proved the latest to flower of all the varieties of *I. germanica*.

[N.B. The plant, which is in commerce under the name of *I. germanica* var. *grisea* and which flowers at the same time as the various varieties of that species, is however quite distinct. Its origin is unknown but the long narrow green spathes and its inflorescence show that it is not a *germanica*.

The stem is about a foot in height and bears one lateral branch besides the terminal head and a reduced sheathing leaf. The spathes are very nearly 3 in. long, narrow and almost wholly green, being only slightly scarious at the extreme tip. The perianth tube is under an inch long. The colour is a faint blue grey, the segments being veined at the base with a reddish purple, which on the falls passes first into bronze and then into a yellowish green near the end of the beard. This is composed of white hairs tipped with yellow.

The plant is not free flowering and, from the malformed style branches and stigma, I am inclined to think that it must be a hybrid, possibly of one of the Indian pogoniris, of which the green spathe valves are characteristic.]

†Var. *florentina*.

SYNONYMS.

I. florentina, *Ker-Gawl. in Bot. Mag. t. 671 (1803).

I. pallida, *Kohler, Mediz.-Pflanz. 1 (1887).

The nomenclature of this plant is extremely complicated but the Bot. Mag. figure is clear and obviously represents the plant that is now commonly cultivated as *I. florentina*. Of the other figures that have been published as *I. florentina*, some¹ represent *I. albicans* (see p. 161 and Plate XXXV), while others² depict white flowered Irises that cannot be identified with certainty. Linnaeus' species *I. florentina* Syst. Nat. ed. x. p. 863 (1759) can hardly stand, for he refers us to Plate 154 in Miller's Icones—a figure of a white flowered form of *I. spuria* with an exaggerated pubescence on the falls, although the plant was described as a bearded Iris (see p. 63).

If we adhered strictly to the chronological order of publication, we should have to attach Redouté's name of *I. florentina* to the plant that we know as *I. albicans* (l.c.) but since this would only lead to confusion, it seems better to keep the name for the Bot. Mag. plant.

¹ E.g. *Red. Lil. t. 23 (1802).

² E.g. *Sibth. Fl. Graec. t. 39.

The variety is well known in gardens, where it flowers in May with *I. germanica*. Hitherto, it has been given specific rank but it is difficult to separate it by any character except colour from *I. germanica*, with which it agrees in its inflorescence (cf. Fig. 21, p. 163), in the character of the spathes, in the narrow leaves that attain some length before midwinter and in the formation of the tube and ovary. The similarity between the two plants had already struck me and my impression of their identity was confirmed last year (1911) by the flowering of a plant, which I had obtained from Florence through the kindness of Messrs Barr and Sons. It occurred among a batch of plants that were obtained as specimens of the source of "Orris Root" and, besides showing that *I. germanica* and *I. pallida* are used indiscriminately for that purpose, they also provided an exact purple counterpart of *I. florentina*. This Florentine example of *I. germanica* had slightly more scarious spathes and longer, narrower falls than those of the purple form most commonly known in English gardens. These two characters are typical of the variety *florentina*, as is also the slender stem.

I. germanica var. *florentina* is distinguished from *I. albicans* by the following differences:

- (1) Leaves narrower, paler and more yellow green.
- (2) Flowers not pure white, especially on the blade of the falls, which show traces of pale blue or purple colouration.
- (3) Spathes nearly wholly brown-scarious at flowering time.
- (4) The lower lateral branch on the stem is 3—4 in. long, whereas in *I. albicans* it is much shorter.
- (5) The standards bear near the base on the inner side of the haft a few straggling white hairs which are never present in *I. albicans*.

[N.B. It should be noticed that the photograph named *I. florentina* in Lynch, Book of the Iris, p. 150, is obviously a mistake and represents *I. pallida*. This is clearly shown by the entirely scarious spathes of the undeveloped buds and by the short thick-set beard.]

Observations.

The origin of *I. germanica*, which is perhaps the most widely cultivated of all Irises, is shrouded in mystery and is indeed a problem of which we can hardly hope to find any solution. As in the case of many other Irises of the Pogoniris section, it is extremely difficult, when dealing only with herbarium specimens, to separate the various local forms, which seem undoubtedly to exist. As garden plants they are easily distinguishable and the series stretches from Fontarabie in the West through Europe and Asia Minor to Kashmir and Nepal in the East.

The various forms have already been described but attempts to ascertain whether all or any of them will come true from seed have not hitherto met with much success. In England at all events it is extremely difficult, if not impossible, to obtain seeds, even when the flowers are carefully pollinated. For some reason or other, the reproductive organs are often malformed and the pollen is for the most part imperfect, so that the sterility of the plants is easy to understand. In warmer climates there is presumably less difficulty in obtaining seeds of *I. germanica*, for slight colour variations abound for instance in the south of France, where nearly every wayside station near Tarascon and in the Camargne, has long lines of slightly different forms. Among all these the common English type with flowers of two shades of distinctly blue purple is perhaps the least common, for the predominating colour is a rather redder purple.

It must be admitted that we do not know to which of these many forms Linnaeus gave the name of *I. germanica* and it is indeed probable that his species was based on a confusion between some form of *I. germanica* and *I. aphylla*. This becomes apparent when we try to trace the plant back to the earliest mention of it. We find first that Linnaeus quotes the Hortus Cliffortianus (Amsterdam, 1737), which in its turn refers us to Johannes Bauhin's Historia Plantarum Universalis (1630-51). In this latter work, on page 708, we find an account of an Iris *vulgaris violacea seu purpurea hortensis et sylvestris* and on the next page a figure of the plant, which has the characteristic inflorescence of what is now commonly grown as the type of *I. germanica* (see Fig. 21, p. 163). Bauhin's account is not, however, first hand, for he quotes Valerius Cordus' Historiae Plantarum (1561), where we at last find the origin of the confusion.

Cordus (vol. 1. p. 133) in fact describes two plants, the first of which he calls *sativa* or *vulgaris* and the second *silvestris*. He distinguishes them by saying that the former has leaves that remain green throughout the winter¹, which is a characteristic of *I. germanica*, while *silvestris* has no leaves in winter, a six-grooved ovary, a shorter stem and more purple flowers. He adds also that it blooms three weeks earlier than *sativa*. This *I. silvestris* is almost certainly *I. aphylla* L., a Central European plant common in Bohemia and Hungary.

Here then we have the explanation of Joh. Bauhin's confused phrase *I. vulgaris violacea seu purpurea hortensis et silvestris*. The violet-flowered garden plant we may presume to be *I. germanica* and the sylvan purple-flowered Iris is *I. aphylla*. The confusion between the two plants is kept up by

¹ "Cum sativae folia hyemis sevitiae contumaciter resistent."

Caspar Bauhin in his *Pinax*, pp. 30, 31 (1623) and quoted, as we have seen, in the *Hortus Cliffortianus*, from which Linnaeus apparently took his *I. germanica*.

Assuming then that some form of what we now know as *I. germanica* was either described by Linnaeus or was included in his description, we may define the species as having (1) a branched stem with usually two lateral branches and four flowers in all (see Fig. 21, p. 163), though another lateral is sometimes produced, (2) spathes of which the upper third or half is scarious at flowering time, (3) foliage of some 6 or 10 inches in length in winter. The colour of the flowers is very variable and may be of a blue, lilac, or red purple, the standards being usually, but not always, of a lighter shade than the falls. The seeds are of a long oval or pyriform shape in the few examples that I have obtained and not compressed and angular as are those of *I. pallida*.

I. germanica is most tenacious of life and it is really very hard to kill the rhizomes. I have even found that a rhizome, torn up and left exposed on its back on a path, soon began to grow in this position. It will live, and even thrive, on the top of old walls or of a thatched roof, where it is often seen in Normandy. As a consequence of its great vitality it has become very widely distributed and it is at least uncertain whether it has ever yet been found growing in any position so remote from any inhabited area that there seemed no likelihood of its being an escape from cultivation. If we may judge by analogy from other species, the habitat of *I. germanica* must probably have been somewhat south of the Alps and not in a mountainous region, where snow lies in winter.

As there are several colour forms of *I. germanica*, so also have several of these forms their albino counterpart. Of these one has long been known as *I. florentina* (see p. 164), which is quite a distinct species to *I. albicans* (see p. 161). It was only recently that I obtained from Florence through the courtesy of Messrs Barr and Sons the variety of *I. germanica* with a slender stem, of which *I. florentina* is the exact counterpart. Of the form *atropurpurea*, I found a white form growing profusely on the hill at Beaucaire, on which stands the ruined castle of St Louis. Both the purple and the white forms grow there together and apart from colour the only difference was the presence of a few hairs on the standards of the white forms. These hairs were, as far as I could see, never present on the purple flowers. This difference is however of no great importance, for I have often found cases both in this and in other species where on one of the three standards no hairs could be seen, while they were obvious on the other two. In *I. florentina* they are always present and conspicuous.

Cultivation is of the simplest (see p. 156).

†*I. PALLIDA*

- Lamarck, *Encycl.* III. p. 294 (1789).
- *Bot. Mag. t. 685 (1803).
- *Reichb. *Icon.* IX. t. CCCCXL. fig. 767 (1847).
- Baker in *J. L. S.* XVI. p. 146 (1877).
- Hdk. *Irid.* p. 38 (1892).

SYNONYMS.

- I. glauca*, Salisb. in *Trans. Hort. Soc.* I. p. 302 (1812).
- I. odoratissima*, Jacq. *Hort. Schoenb.* t. p. 5, t. 9 (1797).
- I. pallide coerulea*, Pers. *Syn.* t. p. 51 (1805).

DISTRIBUTION. Uncertain, the plant is, however, probably a native of the Tirol.

- Brixen, 18—, Hofmann (V).
- 18—, Huter (K).
- 18—, Lager (K).
- Bozen, 1875, Hausmann (V).
- 1910, Schreiber (HortD).
- Trient, 1882, de Sardagna (B) (V).
- Gargnano, 18—, Jauhini (V).

Diagnosis.

I. pallida Pogoniris; ab *I. germanica* foliis pallide glaucis, *spathis* omnino scariosis, argenteis, *tubo* brevi, *seminibus* compressis differt.

Description.

Rootstock, a stout rhizome.

Leaves, 12—24 in. by 1½ in., of a very glaucous grey-green, ensiform.

Stem, 2—3 ft. high, bearing several short lateral branches, each set in a sheathing scarious bract, except in the case of the lowest. Here the bract-like leaf is green and sometimes 6 in. long (cf. Fig. 22).

Spathe valves, short, entirely scarious, even before the buds open, silvery-white, 2—3 flowered.

Pedicel, very short.

Ovary, short, with six grooves at equal intervals.

Tube, about ½ in., equal in length to the ovary.

Falls. Obovate, with a wedge-shaped haft, of a pale mauve purple colour, except on the haft, which bears veins of a deeper brown purple colour on a paler ground. The thick beard is in front white tipped with yellow and behind of a deeper orange colour.

Standards. Obovate with a short channelled haft, of a slightly paler shade of mauve purple than the falls; the haft is slightly veined with brown purple.

Styles, broad, keeled, pale at the edges and more deeply coloured along the centre.

Crests, small, triangular.

Stigma, broad, entire.

Filaments, pale mauve, much longer than the anthers.

Anthers, small, cream.

Pollen, cream.

Capsule, oblong, trigonal; a form of *I. pallida* from Monte Brione near Riva¹ has a short, broad, six-ribbed capsule, but I believe that this plant is a hybrid of *I. pallida* and *I. Cengialti*.

Seeds, dark red brown, compressed, angular, irregularly cubical.

Observations.

If this Iris is really, as appears to be the case, a native of the valleys of southern Tirol, it is at least curious that there is no definite trace of it in botanical literature before 1789. It is possible that the *Iris latifolia major Illyrica* of the Hortus Eystettensis, Plant. Vern. Ordo viii, Fol. iv, No. 3, and of C. Bauhin's Pinax, p. 31, which was described as being "coloris dilute coerulei pallescentis" and as having a somewhat stouter rhizome than *I. florentina*, may be identified as *I. pallida* and in that case it is difficult to see why Linnaeus omitted it from his list of Iris species.

No one who had ever seen *I. pallida* develop its inflorescence could fail to separate it from *I. germanica*, for it is distinguished at once by its silvery-white scarious spathes, even when the plant is only in bud, by the very short tube, by the very glaucous leaves, which do not grow to any extent during the winter as do those of *I. germanica*, and by the broad spreading character of the falls of the flowers. The stem attains a height of about three feet and bears a more complicated inflorescence than that of *I. germanica* (cf. Fig. 22, p. 167, and Fig. 21, p. 163). It is not entirely erect, for the internodes tend to zigzag slightly. The bracts, which sheathe the bases of the lateral branches, are all as scarious as the spathes except that which clothes the lowest branch, which remains green.

The finest form of *I. pallida* is that which is known in gardens as *dalmatica*², though its native locality has never apparently been exactly determined. The foliage of this is broader than that of the type, being often 2 in. wide or even wider, and very glaucous. The stem is rather shorter than that of the type but is thicker, and the flowers, which are supported on shorter lateral stems, are of a lilac shade of purple and have considerable substance. The tendency of the falls to spread rather than to droop is very marked.

I. pallida is separated by another character from *I. germanica*, namely, by its compressed angular seeds, a feature which also distinguishes it from *I. Cengialti*; in the latter the seeds are globose or pyriform and of a greyish colour, instead of irregularly cubical and red brown.

I. plicata, which is to all intents a *pallida* except in colour (cf. *I. Swertii*³, which stands in the same relation to *I. Cengialti*), is probably either an approximately albino form or a hybrid of *I. pallida* in which some factor or combination of factors succeeds in suppressing the purple colour except for the veins on the edges of the standards and falls. Plants of this type, of which "Mme Chereau" is perhaps the best known example, are common in gardens and the amount and exact shade of the veining vary considerably.

Another form of *I. pallida* has the foliage variegated with broad bands of yellow, a feature which to most observers will probably appear more striking than beautiful.

Several forms of *I. pallida* have been described as growing wild in Sicily, but their behaviour in winter hardly suggests that they are natives of a country with so genial a winter climate that the undoubtedly native *I. pseudopumila* can grow rapidly with the advent of the autumn rains and retain its foliage throughout the winter. It is, of course, possible that the forms in question were originally introduced from Northern Italy and that they have become naturalised in Sicily in the course of ages, and moreover they appear for the most part to be of hybrid origin.



FIG. 22. Typical inflorescence of *I. pallida* and an enlarged drawing of one bud showing the wholly scarious spathes.

¹ See Foster in Gard. Chron. 1886, t. p. 586.

² Cf. Journ. Hort. ser. 3, LVI, p. 545.

³ Named after Sweet, who figured it in his Florilegium (1612), t. 40, fig. 3, as *Chamaeciris oris coeruleis alba*, Syn. *I. aphylla*, Hort. non Linn.; cf. *Gécl, Ser. Bot. vol. 1. (1839) and *Sweet, Brit. Flow. Gdn. ser. II vol. III, t. 254 (1834).

Var. *sicula*, Baker in J. L. S. xvi. p. 146 (1877).

SYNONYM.

I. sicula, Tod. Nuov. gen. e Spe. p. 7 (1858).

An extract from a letter from Todaro in Foster's MSS. says that this Iris is very common in Sicily but is found also in Pantellaria, Trapani, Lescara and Sardinia, and that it is distinguished from *I. germanica* and *I. florentina* by the fact that it loses its leaves when these retain them. This fact, combined with Todaro's statement in his original description that the spathes are only scarious at the apex and margin, points to a hybrid origin of the plant.

††*I. CENGIALTI*

Ambrosi, Fl. Tirol. Merid. i. p. 643 (1854).

Foster in Gard. Chron. 1886, i. p. 555.

Var. *illyrica*.

SYNONYMS.

I. illyrica, Tommasini, Veg. Veglia in Cubich, Nat. e storia Veglia, pp. 63, 81 (1875).

Visiani, Fl. dalm. Suppl. alt. p. 53 (1877).

Fiori e Paoletti, Fl. anal. Ital. i. p. 224 (1896).

I. pallida, Lam. var. *dalmatica*, Pampanini in Bull. Soc. Bot. Ital. 1908, p. 137.

[This seems to be the same as the var. *illyrica* to judge by the locality in which it was found and by the small, globose capsule on which Pampanini insists. It is not the *Iris pallida dalmatica* of our gardens, which is a large *pallida* with pale lilac flowers of much substance closely set on a stout stem.]

DISTRIBUTION. From the neighbourhood of the Lago di Garda to the north-eastern shores of the Adriatic.

Monte Cengialti near Roveredo, 1867, Porta (BM).

1871, Porta (B) (K).

1872, Porta (V).

1894, Porta (B) (BM).

1906, Porta (K) (E).

Gargnano, 1872, Porta (K) (V).

Monte Baldo (near the lake of Loppio), 1884, Foster (HortD).

Monte Brione, 1881, Porta (B).

Val Lagarino, 1869, Porta (B) (BM).

Lippiza (Trieste), 1837, Hb. Bentham (K).

Karst, 1839, Tommasini (K) (C) (V).

Carniola, Reka Valley, Mt Vremscica, 19—, Paulin, no. 607 (BM).

Isl. Veglia (Quarnero) 1869, Smith (K).

Croatia; Zengg, 1911, Rothschild (HortD).

Veljun, 1911, Dobiasch (HortD).

Diagnosis.

I. Cengialti Pogoniris; *I. pallidæ* similis sed nana; semina ovalia vel pyriformia nec compressa.

Description.

Rootstock, a compact somewhat slender rhizome.

Leaves, ensiform, acuminate, of a somewhat dark only slightly glaucous green; the outer leaves of a tuft are usually somewhat falcate.

Stem, about 12 in. high, the inflorescence being that of *I. germanica* (Fig. 21, p. 163).

Spathe valves, distinctly scarious while the plant is still in bud, but not silvery white like those of *I. pallida*. They are distinctly brown scarious as in the case of *I. germanica*. At the base there is often a purple transverse line. 1—1¼ long.

Pedicel, none or only ½ in.

Ovary, about equal to the tube in length, bright green, very distinctly six-grooved.

Tube, about ¾ in., mottled and marked with purplish stripes on a brownish-green ground.

Falls, broadly obovate cuneate of a uniform blue-purple colour, the blade being much longer than the haft, which is veined with brown purple on a grey-white ground. The broad beard is composed of short thick white hairs tipped with orange, always at the base and usually in front also.

Standards, obovate with a short canaliculate haft. The blade is of a fine blue purple, of a slightly lighter shade than the falls. The haft is veined with red purple on white. The presence or absence of hairs on the haft does not appear to be constant.

Styles, lighter than the rest of the flower, keeled.

Crests, very finely dentate, the teeth being so fine as to be hardly visible, small.

Stigma, with a nearly straight horizontal edge.

Filaments, nearly twice as long as the anthers.

Anthers, small cream.

Pollen, cream.

Capsule, bluntly oval in outline, with six depressions running down the sides.

Seeds, small, pyriform or oval, greyish, not angular nor red-brown as in *I. pallida*. They resemble rather the seeds of *I. pumila*, except perhaps in colour.

Observations.

The earliest mention of *I. Cengialti* is probably by Clusius, *Hisp.* p. 284 (1576). Clusius there states that he had received a plant from one Alfonsius Pancius, Physician to the Duke of Ferrara, which he describes as an Iris producing three or four flowers of a paler purple than his Portuguese *I. biflora* (= *I. subbiflora* Brot., p. 145). The first figure under the name of *I. dalmatica minor* occurs in Lobel's *Kruidtboeck*, which was published at Antwerp in 1581 and Lobel there mentions that it came to Dutch gardens from Pancius. The figure was copied in Lobel's *Icones*, p. 62, where the woodcut clearly shows the small membranous spathe valves which are so marked a feature of the plant.

Subsequently, the plant seems to have been confused with a form of *I. aphylla*, for instance by Tausch in describing his *I. Clusiana* in *Flora xii. i. Ergän.* p. 49 (1829). Tausch there refers to Clusius and Lobel, but his expression "spatha herbacea" shows undoubtedly that he had before him a specimen of *I. aphylla* and not of *I. Cengialti*.

The exact relationship of *I. Cengialti* to *I. pallida* is not yet determined. Its affinity to *I. pallida* is apparent in the wholly scarious spathes, which, however, are of a pale brown colour and not silvery-white as in *I. pallida*, in the short tube, and possibly in the fact that the two plants hybridise very freely and produce hybrids which are themselves fertile. The leaves, however, are distinctly green when contrasted with the glaucous foliage of *I. pallida* and the seeds are oval or pyriform and of a greyish colour, not red-brown and compressed.

The question of the specific value of the green or glaucous character of the leaves is somewhat intricate. On the one hand, *I. pallida* fertilised with pollen of the *Loppio* variety of *I. Cengialti* gives plants with distinctly narrow green, as opposed to glaucous leaves¹, while the Illyrian form of *I. Cengialti* differs from the type chiefly in its distinctly glaucous foliage. Its seeds also are larger and tend to become compressed, so that the var. *illyrica* is almost intermediate between *I. pallida* and *I. Cengialti*.

The *Loppio* variety of *I. Cengialti* was collected by Foster on Monte Baldo near the Lago di Loppio and differs from the type in its foliage which in the early stages tends to be of a bluish-green by contrast with the somewhat yellow-green of *I. Cengialti*. It also flowers later and has darker, and less blue-, purple flowers and the purple line at the base of the spathes is also more marked.

Cultivation is easy in a sunny well-drained position in a soil that is not deficient in lime. Seedlings show considerable variation in colour and it is for this reason that the claim of the *Loppio* form to a varietal name is at least doubtful.

* * *

The remaining names in this section probably represent plants that have no real claim to specific rank (see p. 173). They are retained here, since they are of some use in the garden to denote certain classes of hybrids.

† *I. AMOENA*

*De Candolle in *Red. Lil.* t. 336 (1812).

*Sweet, *Brit. Flow. Gdn. Ser. II. Vol. II. t. 165* (1832).

[N.B. Sweet's figure appears to represent a plant in which the markings on the falls are of a distinctly red shade.]

Observations.

The original description and figure of this Iris of uncertain origin depict a bearded Iris with white standards and falls veined with dull violet-blue on a white ground. Near the extremity of the blade these veins run together and almost entirely obscure the white groundwork. The spathes are green and the leaves are tinged with purple at the base.

This Iris is probably a hybrid, but it is not yet possible to say with certainty what species must be combined to produce it. All that is certain is that among seedlings of European bearded Irises large numbers of this type appear. It is possible that it is merely a form or sport of *I. variegata*, in which the yellow colour is absent and replaced by white. Cf. *I. variegata* var. *lepidota* (p. 160).

† *I. FLAVESCENS*

*De Candolle in *Red. Lil.* t. 375 (1813).

*Sweet, *Brit. Flow. Gdn. Ser. II. Vol. I. t. 56* (1830).

Baker in *J. L. S.* xvi. p. 145 (1877) ex parte.

Hdk. *Irid.* p. 35 (1892) ex parte.

*Rchb. *Ic. Crit. Vol. X. fig. 1242* (1831).

¹ Similar plants are common in the neighbourhood of Riva in what appear to be wild conditions. I have been able to grow specimens side by side with the home-raised hybrids.

DISTRIBUTION. The origin of this plant is not really known and the statement found in Baker and elsewhere that it comes from Bosnia is probably based on Kummer und Sendtner's statement in *Flora* XXXII. p. 763 (1849) that specimens were found on Mt. Vlassich (?=Vlašić Planina). Asch. und Graebn. (*Syn.* III. p. 476 (1906)) make this plant synonymous with their *I. virescens* var. *bosniaca* (see *I. Reichenbachii* (p. 151)), but this identification can hardly be correct for Kummer und Sendtner say that it is similar to *I. squalens* except in the colour of the falls, which are yellow with pale veins. This points to its being a form of *I. variegata*, cf. *I. leucographa* (p. 160).

The frequently repeated statement that *I. flavescens* is a native of the Caucasus is due to its erroneous identification with *I. imbricata* Lindl. (see p. 179). It is doubtless a garden hybrid and has no real claim to specific rank.

Description.

Rootstock, a stout rhizome.

Leaves, ensiform, glaucous, about 12—15 in. long at flowering time by 1—1½ in. broad, withering away almost entirely in late autumn.

Stem, twice as long as the leaves, bearing 3—4 heads of flowers in a fuller inflorescence than that of *I. germanica*.

Spathes, 2—3 flowered, largely but not entirely scarious at flowering time, about 1½—2 in. long.

Pedicel, very short.

Ovary, under ½ in. long, with six slight grooves at equal intervals.

Tube, about ¾—1 in., rounded trigonal.

Falls, obovate cuneate, 2½ in. long by 1¼ in. broad; the blade is of a very pale yellow, almost white, with slight brownish veins which are most marked in the neighbourhood of the beard. Along the haft, the brown veins become much bolder. The beard is pale yellow tipped with orange in front, becoming more wholly orange behind.

Standards, obovate unguiculate, pale lemon yellow, slightly yellower than the falls; the haft is slightly veined with brown at the base and bears a few scattered hairs, often on only one of the three standards.

Styles, keeled, pale yellow, oval.

Crests, large, broadly trigonal, with coarsely toothed edge.

Stigma, entire.

Filaments, colourless, longer than the anthers.

Anthers, cream.

Pollen, white.

Capsule,

Seeds,

Observations.

This Iris is very commonly grown in gardens, where it flowers in May immediately after *I. germanica*. As has been already pointed out, it has long been confused with *I. imbricata*, from which it is easily distinguished by its ampler inflorescence, by the colour of the flowers and by the scarious and not inflated membranous spathes.

It is probably of hybrid origin and I have it on the authority of Mr C. J. Bliss that it once appeared in his garden as one of the seedlings resulting from a cross between the *pallida* variety "Queen of May" and the *amoena* "Thorbeck." This points to its being a hybrid of *I. pallida* or *I. variegata*.

I have never yet been able to induce *I. flavescens* to set seed even with artificial pollination—a fact which may also point to its hybrid origin.

†*I. KOCHII*

(PLATE XXXVI)

A. Kerner; Stapf in *Verh. Zool. bot. Gesell. Wien*, XXXVII. p. 649 (1887).

Baker, *Hdk. Irid.* p. 35 (1892).

Cf. also the note on *I. germanica* var. *australis* on p. 164.

DISTRIBUTION. I have seen no herbarium specimens of this Iris except the original set prepared by Kerner, which were described by Dr Stapf. These specimens are now in the Herbarium of the Botanisches Institut of the University of Vienna and were gathered in 1872 from plants cultivated in the garden there which had been received in 1871 from Tommasini, with the information that they grew on rocky ground near Trieste and Rovigno.

Description.

Rootstock, a fleshy rhizome, resembling that of *I. germanica*.

Leaves, 12—15 in. long, ensiform, slightly glaucescent.

Stem, about 18 in., bearing a terminal head of two flowers and about two lateral flowers.





Spathe valves, lanceolate, the outer partly green and the inner largely scarious at flowering time, tinged with purple at the edge.

*Pedice*l, none or very short.

Ovary, much rounded trigonal with six shallow grooves.

Tube, about an inch long, brownish-green.

Falls, $3\frac{1}{2}$ —4 in. long by $1\frac{3}{4}$ in. broad, obovate with a broad wedge-shaped haft. The blade is of a fine purple violet and the whitish half is veined with thick brown-purple veins. The beard is narrow, of bluish-white hairs tipped with yellow.

Standards, $3\frac{1}{2}$ —4 in. long by 2 in. broad, broadly obovate with a short canaliculate haft. The colour is a fine purple-violet, slightly lighter than that of the falls.

Styles, broad, keeled, pale violet, about $1\frac{1}{4}$ long.

Crests, deltoid, with a coarsely serrated outer edge.

Stigma, entire, broad.

Filaments, white tinged with violet.

Anthers, whitish, equal in length to the filaments.

Pollen, cream.

Capsule, oblong, rounded trigonal.

Seeds, large, elongated pyriform, brown, wrinkled.

Observations.

This Iris is probably nothing more than a form of *I. germanica* but as we have no means of knowing whether it is a wild or a garden form, it seems best to leave it as a subspecies. Seeds are rarely produced in England, and I have not yet had time to raise plants from the few that the hot summer of 1911 enabled me to obtain.

As a garden plant it is perhaps the smallest of the true *germanicae* and some care is needed to distinguish it from another variety known as *nepalensis*, *atropurpurea* or Purple King (see p. 163). The chief differences are the slightly dwarfer habit of *I. Kochii* and the fact that the veining on the falls is scarcely obvious beyond the end of the style branches, while in the var. *nepalensis* the whitish ground is clearly seen.

In dealing with herbarium material, it will be found that the names of *I. Kochii* and of *I. benacensis* are often wrongly attributed to specimens of *I. Cengialti*, which ought easily to be distinguished at once from either by its small and entirely scarious spathes (see p. 168).

The cultivation of *I. Kochii* presents no difficulty in a well-drained soil.

† *I. LURIDA*

Soland in Crit. Hort. Kew, ed. I. vol. I, p. 68 (1789) non Spach.

Willd. Spec. Plant. ed. IV. p. 229 (1797).

*Bot. Mag. t. 986 (1807).

*Red. Lil. t. 318 (1812).

[*Bot. Mag. t. 669 (1803) admittedly represents a different plant, which came from a nursery in Kensington.]

SYNONYM.

I. Redouteana, Spach, Hist. Vég. Phan. XIII. p. 56 (1846).

DISTRIBUTION. Unknown.

Description.

Rootstock, a rhizome, somewhat more slender than that of *I. germanica*.

Leaves, ensiform, rather narrow, about 6—8 in. long at flowering time but growing eventually to a foot in height.

Stem, about 18 in., bearing four bract-like leaves and a terminal head of two flowers and sometimes one lateral flower.

Spathe valves, green flushed with purple in the lower half and scarious in the upper part, not keeled, 2 in. long.

*Pedice*l, very short, only $\frac{1}{8}$ in.

Ovary, cylindrical or very obscurely trigonal, with thick walls.

Tube, about 1 in., yellow-green, trigonal.

Falls, long and narrow, spatulate, with a reddish-maroon blade, the haft bearing veins of the same colour on a yellow ground. The beard consists of orange hairs and is very prominent. 3 in. by 1 in.

Standards, oval, unguiculate, emarginate, connivent, brownish-purple, concolor, the haft being yellowish with brown-purple mottlings; slightly shorter than the falls. $2\frac{3}{4}$ in. by $1\frac{1}{4}$ in.

Styles, yellow with a purple keel.

Crests, small, darker than the styles, brownish-purple, subquadrate with jagged edges.

Stigma, large, oblong, entire.

Filaments, yellowish-white rather longer than the anthers.

Anthers, cream.

Pollen, cream.

Capsule,

Seeds,

Observations.

This Iris has been the subject of much confusion which was created by Spach when he described (*Lc.*) an *I. Redouteana* as different from *I. lurida*. He bases his description on Redouté's description and figure and says that it differs from Willdenow's *I. lurida*. As, however, both Redouté and Willdenow quote Solander's original description in the Hortus Kewensis, it is difficult to see what ground Spach had for setting up his species.

The plant described and figured by Solander and Redouté is still in cultivation and is not improbably of hybrid origin. The colour and the shape of the falls seem to point to *I. variegata* as one of the parents and the theory of its hybrid origin is supported by the fact that it appears to be sterile. The only difficulty is that it flowers early, about a month before *I. variegata*.

Cultivation is easy and the plant is valuable for its flowers of a somewhat unusual colour. It has the additional advantage of sometimes flowering a second time in the autumn, which is a further argument in support of the theory of its hybrid origin. In cultivating a large collection of Irises, it will be found that hybrids are much more apt to flower a second time in the autumn than are species.

Spach's *I. lurida* (Hist. Vég. Phan. xiii. p. 56 (1846)), which he identifies with Bot. Mag. t. 669 (1803), has larger, slightly paler reddish-purple flowers than the real *I. lurida* and also a taller and more ample inflorescence. It was probably one of the *sambucina* or *squalens* hybrids of which there are innumerable forms (see p. 234).

†*I. NEGLECTA*

Hornemann, Hort. Hafn. i. 55 (1813).

*Bot. Mag. t. 2435 (1823).

Observations.

This is probably of hybrid origin and is similar to *I. amoena* except that the standards are blue or lilac instead of white and the falls are more closely veined and consequently show less of the light groundwork. The spathes are scarious in the upper half and the tube is a little longer than the ovary. The leaves are noticeably ribbed,—a feature, which suggests affinity to *I. variegata*.

†*I. SAMBUCINA*

Linn. Spec. Plant. ed. ii. p. 55 (1762).

Rchb. Ic. t. CCCXXXV. fig. 762 (1847).

Hausmann, Fl. Tirol, ii. p. 859 (1852).

[N.B. Baker's variety *concolor* in Gard. Chron. 1876, ii. p. 774 is probably only a garden form.]

†*I. SQUALENS*

Linn. Spec. Plant. ed. ii. p. 56 (1762).

Rchb. Ic. t. CCCXXXVI. fig. 763 (1847).

Hausmann, Fl. Tirol, ii. p. 860 (1852).

[N.B. In the Botanical Magazine these names appear to be reversed, for t. 187 (1793) "*I. sambucina*" probably represents the red-purple form of *I. squalens* mentioned above, while t. 787 (1805), named *I. squalens*, is presumably the blue-purple *I. sambucina* from Bozen referred to in the Observations, p. 173. Baker followed the same arrangement.]

Observations.

It seems impossible to give any satisfactory account of these two Irises. Their history is not at all clear and we may perhaps be permitted to infer that Linnaeus had some doubt as to their claim to specific rank from the fact that he did not include them in his first edition of the Species Plantarum.

It is only in the tenth edition of the Systema (1759) that we find described on p. 863 an Iris no. 3A under the name of *I. sambucina* and no. 3B under that of *I. squalens*. They are only distinguished in one point, namely in the character of the falls (*sambucina* "*petalis deflexis planis*"; *squalens* "*petalis deflexis replicatis*"). The meagre descriptions given were presumably felt to be inadequate, for in the second edition of the Species Plantarum (1762) on p. 55 they are amplified and made less vague. We gather from this account that *I. sambucina* had violet or bluish flowers with bluish style branches, while in *I. squalens* the yellow-white veins on the bluish ground of the falls were more marked and the standards and style branches of a dingy yellow.

This description of *I. sambucina* agrees fairly well with the plate in Reichenbach's *Icones cccxxxv*, fig. 762, which is also mentioned by Hausmann *Flora von Tirol (Lc.)* as representing a plant that grows near Bozen. This plant I have obtained and cultivated and if the identification is correct, then the description may be further amplified as follows.

Leaves, with purple colouration at the base.

Stem, much branched, and many flowered, for even the lateral branches bear 3 flowers.

Spathes, $1\frac{1}{2}$ in. long, largely but not wholly scarious.

Pedicel, none in the case of the two outer flowers in each spathe but $\frac{1}{4}$ in. long in the case of the centre flower, which is the last to bloom.

Ovary, $\frac{1}{2}$ in. with six grooves at equal intervals.

Tube, $\frac{3}{4}$ in.

Falls, obovate-cuneate; the blade much veined with deep bluish-purple on a grey-white ground; the veins coalesce towards the tip of the blade. On the haft the veins are rather brown-purple on a yellow-white ground. The beard is orange.

Standards, obovate with short canaliculate haft; the blade of a dingy yellowish-purple and the haft veined with brown-purple on yellow.

Styles, dingy yellow with a sharp blue-purple keel.

Crests, large, broadly triangular, of the same mixed colour as the standards.

Stigma, entire.

Filaments, white, tinged with faint lavender.

Anthers, small cream.

Pollen, cream.

Capsule and pollen not seen, because the plant appears to be usually sterile.

Observations.

The plant just described is not that usually grown as *I. sambucina* and it sometimes appears under the name of *I. lurida*, e.g. in the Caen Botanic Garden, but it is probably the plant that was the subject of Linnaeus' description.

I. squalens is said in the original description to differ by having standards and styles of a squalid yellow colour. The falls are veined with yellow-white on a bluish ground. Such a form exists in gardens and so does also another in which the bluish ground is replaced by red-purple. The plant already described as *I. sambucina* is so similar to both of these except in colour, which in Irises is a character the reverse of reliable, that it is impossible to look upon them except as hybrid forms and we must acknowledge that further investigation and breeding experiments are necessary before the mystery of their origin can be cleared up.

[N.B. It is not quite clear whether the Bozen plants must be looked upon as really wild or as probable escapes from cultivation. With the specimens that I received came two other plants of much dwarfer growth. In one the standards are clear yellow and in the other of a murky yellow. In both the falls are veined with claret-red on a yellowish-white ground. These plants are quite different from what I take to be *I. squalens*, being much dwarfer and having a much less ample inflorescence. I understand that these plants now grow near Bozen with that described as *I. sambucina*.]

On the whole I am inclined to think that the two plants that Linnaeus described as *I. sambucina* and *I. squalens* were both hybrids of *I. pallida* and *I. variegata*. They are intermediate in many ways between these two species, e.g. in the spathes and in the colour, and the leaves die down in winter as do those of both the supposed parents. The fact that forms closely resembling *I. sambucina* and *I. squalens* have been obtained from crosses between *I. plicata* and *I. variegata* seems to support this view, for *I. plicata* is only apparently an example of *I. pallida* in which some factor is present that prevents the purple colour from appearing except at the edges of the segments. See also p. 234.

†*I. CORYGEI*

Lynch, Book of the Iris, p. 146 (1904).

I am indebted for plants of this Iris to Mr Lynch, of the Cambridge Botanic Garden. It is, in my experience, neither robust nor free-flowering. However, the warm weather in the summer of 1911 and in the spring of 1912 caused the plants to throw up several flower stems, which showed that this Iris is almost certainly of hybrid origin and that one of its ancestors was *I. variegata*.

The leaves are falcate, strongly ribbed and not very glaucous. The spathe valves are short, somewhat inflated, green at the base and scarious in the upper third. The short ovary is six-grooved and the tube about $\frac{3}{4}$ in. long.

The falls extend almost horizontally,—a characteristic feature of *I. variegata*—and are of a pale blue-lilac colour on the blade and veined with yellow-brown on the greenish-white haft. The beard is yellow. The almost orbicular standards are of a still paler shade of light lilac than the falls and they show distinct traces of a suffusion of yellow.

V. *The Pogoniris of Syria and Asia Minor.*

The plants that form this group seem to be closely related to one another, and all with the possible exception of *I. Junonia* have been found in localities in which they were probably importations or escapes from cultivation. Allusion has already been made to the difficulties that surround them (see p. 155). All have tall much-branched stems and flower a month or more later than *I. germanica*.

- | | |
|---|----------------------------------|
| I. Leaves short and not growing to any extent till winter is over. | <i>I. Junonia</i> (p. 174). |
| II. Leaves much taller and beginning to grow in the autumn. | |
| (1) Spathes long, narrow and persistently green except at the edge and extreme tip. | <i>I. Biliotti</i> (p. 175). |
| (2) Spathes half green, half scarious, flushed with purple at the edge, of a distinctly narrow oval shape. | <i>I. trojana</i> (p. 175). |
| (3) Spathes broad, somewhat acuminate and membranous; only scarious in the upper third. | <i>I. mesopotamica</i> (p. 176). |
| (4) Spathes very navicular, the outer valve almost wholly scarious, the inner less so. Stem very long but not always erect. The falls wedge-shaped with almost straight not rounded sides, so that the extremity is the broadest point. Leaves glaucous, narrow, upright. | <i>I. cypriana</i> (p. 177). |

†*I. JUNONIA*

Schott and Kotschy ex Schott in OBZ. (1854) p. 209.

DISTRIBUTION. The plant was first discovered on the Cilician Taurus and it was from there that it has recently been introduced into cultivation. The statement (Siehe MS.) that it is found on all graves over Cilicia, is probably based on a confusion of *I. Junonia* with *I. mesopotamica*.

Paphlagonia; Kastambuli, 1892, Sintenis, no. 3926 (B).

Diagnosis.

I. Junonia Pogoniris; *I. pallidæ* haud dissimilis sed *folia* paullo angustiora, breviora, *spathæ* parte superiore tantum scariosæ; *semina* pyriformia nec compressa.

Description.

Rootstock, a compact, stout rhizome.

Leaves, short in comparison with the stem, 12—14 in. by $1\frac{3}{4}$ at the widest point which is about the middle, glaucous.

Stem, about 20—24 in., bearing a terminal head of two flowers and four lateral branches, the lowest $3\frac{1}{2}$ in. long and the uppermost very short.

Spathe valves, pale-green, scarious in the upper $\frac{1}{2}$ or $\frac{1}{3}$, $1\frac{1}{2}$ in. long.

Pedicel, none.

Ovary, trigonal, with concave sides.

Tube, 1 in. long, green, becoming broader above.

Falls, obovate cuneate; the ground of the haft is white, coarsely veined with yellow-brown. The blade is of a light blue purple, suffused with a redder shade just beyond the end of the beard, which consists of white hairs tipped with orange. $3\frac{1}{2}$ in. by $1\frac{3}{4}$ in.

Standards, obovate unguiculate with a short, channelled haft spotted with red-brown on white. The blade is of a pale lavender blue and the sides are much reflexed laterally.

Styles, broad, almost white, slightly shaded with blue-purple along the keel.

Crests, large, triangular, revolute with serrate edge.

Stigma, entire.

Filaments, anthers and pollen, all cream-coloured.

Capsule, $2\frac{1}{2}$ in. long, trigonal with slightly hollow sides, and grooved at the angles. The walls are very thick.

Seeds, large, pyriform, dark brown, wrinkled.

Observations.

I owe the specimen of this plant, which has flowered with me and produced seed, to the kindness of a friend in the south of France, an enthusiastic and successful grower of Irises. He was fortunate enough to obtain a plant from Messrs Haage and Schmidt of Erfurt, who received it from Herr Siehe when the latter rediscovered it in its original habitat. I am informed that later importations have not turned out to be the true plant but varieties of *I. cypriana* or of *I. mesopotamica*. This accounts for the fact that when Foster received specimens he recognised their specific identity with his *I. cypriana* and owing to the priority in publication of the name of *I. Junonia* proposed to change the name of *I. cypriana* to *I. Junonia* var. *cypriana* (see p. 177 and Gard. Chron. 1905, July 1st).

The true plant is very handsome and quite distinct. It seems to be hardier than some of the forms of *I. cypriana*, whose leaves attain some length before the winter. The foliage of *I. Junonia*

somewhat resembles that of *I. pallida* and dies away almost entirely in the autumn. It has done well with me in a fairly sheltered position in clay soil lightened and enriched with leaf mould. It comes into flower at the end of May and is distinguished by the tall stem with its many branching heads and strikingly short foliage.

† *I. BILIOTTI*

Foster in Gard. Chron. 1887, i. p. 738.

Baker, Hdk. Irid. p. 37 (1892).

DISTRIBUTION. North-eastern Asia Minor.

Siwas; Kalahissar, 1884, Biliotti (Foster MS.).

S. W. Phrygia; Ortakeni (Tchal district), 1888, Ramsay (Foster MS.).

Baktash on west side of Gumular Dagħ at 4200 feet, 1891, Mrs Ramsay (Foster MS.).

N.B. Foster records (MS.) a note from Mrs Ramsay sent with these Baktash plants to the effect that this Iris is only found in Turkish Cemeteries.

Diagnosis.

I. Biliotti Pogoniris; *I. germanicae* affinis et similis sed *spathae* longiores, angustiores, apice tantum scariosae.

Description.

Rootstock, a fleshy rhizome much resembling that of *I. germanica* but possibly somewhat narrower.

Leaves, somewhat darker green, more distinctly striated and more rigid than in *I. germanica*; about 20 in. when full grown by $1\frac{1}{2}$ — $1\frac{3}{4}$ in. at the broadest point, which is above the middle; largely persistent through the winter like those of *I. germanica*.

Stem, $2\frac{1}{2}$ —3 ft. far overtopping the leaves, bearing about 4 flowers, arranged as in *I. germanica*.

Spathe valves nearly 3 in. by $\frac{5}{8}$ in., narrow, acuminate, not keeled, persistent, scarious at the apex only even when the flower is fully expanded, not flushed with purple.

*Pedice*l, $\frac{1}{2}$ in.

Ovary, 1 in. by $\frac{3}{8}$ in., bright green, rounded trigonal, bearing 6 grooves.

Tube, $\frac{7}{8}$ in. bright green, with dull purple mottled stripes in the line of the standards.

Falls, $3\frac{1}{2}$ in. by $1\frac{1}{2}$ in. rounded cuneate; the groundwork of the haft is white with thick, bold dark purple-brown veins; the blade is of a fine reddish-purple, with numerous dark, almost black, veins with a lighter border at the edge; beard white tipped with yellow. The under surface of the haft is bright green with brown dots which are very faint along the median line.

Standards, $3\frac{1}{2}$ in. by 2 in., erect, connivent; blade obovate, emarginate with a canaliculate haft, which is of a whitish colour marked on both surfaces with brown dots and broken veins; the blade is of a fine blue purple, marked with very fine delicate blue veins.

Styles, almost oblong, $1\frac{1}{2}$ in. long by $\frac{5}{8}$ in. wide, with faint purple sides and deeper coloured keel.

Crests, triangular, pointed, reflexed, divergent, reddish-purple made somewhat iridescent by the blue veins

Stigma, entire.

Filaments, white, mottled with purple near the base.

Anthems, shorter than the filaments, cream.

Pollen, white.

Capsule, $2\frac{1}{2}$ in. by $1\frac{1}{4}$ in., ellipsoidal, with six deep grooves.

Seeds, light brown, wrinkled, of an elongated oval shape.

Observations.

This Iris is closely allied to *I. germanica*, with which it agrees in its inflorescence (see Fig. 21, p. 163).

Apart from the colour and shape of the flower, which in *I. germanica* vary within very wide limits, the chief points of difference between *I. Biliotti* and *I. germanica* are to be found in the foliage (see description), in the spathes and in the ovary. In *I. germanica* the spathes are largely scarious at flowering time; they are usually flushed with purple and clasp the tube closely; in *I. Biliotti* they are green (scarious, if at all, only at the very tip) and widely divergent, so as to expose the ovary, which is much more deeply grooved than that of *I. germanica*.

A peculiarity of this Iris is the curiously iridescent colour of the stigmatic crests.

For cultivation see p. 156.

†† *I. TROJANA*

(PLATE XXXVII)

Kerner ex Stapf in Verh. Zool.-Bot. Gesell. Wien, 1887, p. 649.

DISTRIBUTION. Unknown. The original plants, on which the description was based, were introduced into the Vienna Botanic Garden by Sintenis, presumably from the Troad. By the kindness of Dr R. Wettstein I have been able to cultivate for several years specimens of this original importation.

¹ Named after Alfred Biliotti, formerly British Consul at Trebizond, who sent rhizomes to Foster in 1884 (Foster MS.).

Diagnosis.

I. trojana Pogoniris; *caulis* altior et robustior quam in *I. germanica*, ramis pluribus multifloribus; *spathae* fere omnino herbaceae, purpureo suffusae, angustae, elongatae; *semina* compressa.

Description.

Rootstock, as in *I. germanica*.

Leaves, as in *I. germanica*, but longer; distinctly narrow for so large a plant.

Stem, 2 ft. or more in height, bearing about six or eight or more flowers in a terminal head of two flowers, and three lateral shoots with 1—2 flowers. The buds are of a long, pointed oval shape.

Spathae valves flushed with purple, scarious only at the top, not so divergent as in *I. Biliotti*, $2\frac{1}{2}$ —3 in. long, narrow.

Pedicel, short.

Ovary, $\frac{3}{4}$ in. long, rounded trigonal with six very shallow grooves.

Tube, about as long as the ovary, green with purple stripes.

Falls; *under surface*, spotted on the haft, as in *Biliotti*, but with the spots more conspicuous along the median line than at the edges.

Upper surface, obovate cuneate, of a bright red purple, the haft bearing numerous thin chestnut veins on a whitish ground. The beard is in front white tipped with yellow but becomes wholly yellow at the base.

Standards, the obovate pale blue blade narrows somewhat sharply to the short canaliculate haft, which is faintly veined with brown purple.

Styles, short and broad of a pale purplish colour with more deeply coloured keel.

Crests, pointed triangular, with serrated outer edge, purple with blue veins.

Stigma, entire, rounded.

Filaments, white.

Anthers, very long, cream.

Pollen, cream.

Capsule of a long ellipsoid shape with inconspicuous grooves on each side, very bluntly trigonal.

Seeds, wedge-shaped, light brownish, much resembling those of *I. pallida*.

Observations.

By an oversight due apparently to the fact that the original description of the species contained no express mention of the beard *I. trojana* was placed by Baker (Hdk. p. 18) among the Apogons. Struck by the description as being obviously that of a Pogoniris, I applied to the Vienna Botanic Garden and was most kindly supplied by the Director with a number of plants. When these arrived, it was at once obvious that *I. trojana* was a Pogoniris. The flowers proved to agree exactly with the original description.

This fine sweet-scented Iris is fairly common in gardens under the mistaken name of *I. cypriana*, which is a much rarer plant. *I. trojana* is easily distinguished by the long, narrow, purple-flushed buds and by the broader foliage. Cultivation is easy.

†† *I. MESOPOTAMICA*

DISTRIBUTION. Probably unknown. The plant has been imported on several occasions with *I. Gatesii* from the neighbourhood of Mardin.

SYNONYM.

I. Ricardi, Hort.

Diagnosis.

I. mesopotamica Pogoniris; *planta* robusta, *caulis* erectus, 3—4 pedalis, ramosus, multiflorus; *folia* glaucescentia, 2-poll. lata; *spathae* membranaceae, superiore parte scariosae.

Description.

Rootstock, a stout rhizome.

Leaves, ensiform, of a somewhat deep green, slightly glaucous, very broad; 18—24 in. by 2 in.

Stem, 3—4 ft. high, very sturdy, bearing a terminal head of 3 flowers and 2—3 lateral heads each of 2 flowers, the lowest branch being the longest. The stem is erect.

Spathes, 2—2½ in. long, green, thin and somewhat membranous, only scarious in the upper half, somewhat acuminate.

Pedicel, extremely short.

Ovary, rounded trigonal with concave sides and a slight depression running down each angle.

Tube, $\frac{1}{2}$ —¾ in. broad.

Falls. The obovate blade passes without any constriction into the broad haft, which is marked with thick purple-bronze veins on an almost white ground. This colouration ends abruptly about the level of the end of the beard. Beyond this the blade is of a light blue-purple overlaid with a redder shade in the central portion. The beard is almost white in front but becomes almost orange on the haft.



Standards, obovate with a short channelled haft which bears a few indistinct bronze-purple veins on a light ground. The blade is of a pale blue-purple, of a lighter shade than the falls.

Styles, pale in colour except along the central ridge, which is blue-purple.

Crests, triangular, blue-purple.

Stigma, entire.

Filaments, colourless.

Anthers, cream.

Pollen, white.

Capsule, oblong, trigonal, 2—2½ in. long, with thick walls.

Seeds, dark red-brown, wrinkled, somewhat pyriform but often compressed.

Observations.

This fine Iris grows in the neighbourhood of Mardin in northern Mesopotamia, whence it is from time to time imported with *I. Gatesii*. It was first sent to England apparently by the Rev. O. H. Parry and has flowered in more than one garden in this neighbourhood. Unfortunately in this light sandy soil the plants seemed gradually to lose their vigour until now they have almost all succumbed. The same fate has befallen other plants that have been received by Messrs Van Tubergen from the same locality. Fortunately I was able to obtain seeds from the original plants and hope that the seedlings will take more kindly than did their parents to their surroundings and to the climatic conditions prevailing here.

I. mesopotamica was one of the parents, *I. pallida dalmatica* being the other, of the fine hybrid, named Carthusian, which was raised some years ago and exhibited in London by Mr J. W. Marshall, a former colleague and neighbour.

I. mesopotamica is distinguished from *I. cypriana* by its broad foliage, by the spathes, which are only slightly scarious in the upper part at flowering time, by the shorter perianth tube and by the shorter and less prominent beard. These differences are scarcely sufficient to separate two species but the plants are certainly distinct horticulturally if not botanically, and it seemed better therefore to describe them under different names, even if a better knowledge of the plants leads to their being eventually regarded as mere varieties of one species.

The Iris grown in France under the name of *I. Ricardi* was found in a garden near Jerusalem and is apparently only a form of *I. mesopotamica*. In warm climates, in the south of France for instance, in the heavy limestone soil, this Iris is magnificent and, when crossed with various bearded species and hybrids, has given rise to a series of fine plants, much larger and sturdier than the usual so-called "German" Irises. Unfortunately, it is only in warm sheltered positions in heavy calcareous soil that these fine hybrids seem capable of doing really well in England.

† *I. CYPRIANA*

Baker and Foster in Gard. Chron. 1888, II. p. 182.

Baker, Hdk. Irid. p. 37 (1892).

DISTRIBUTION. All that is known of the origin of this plant is that it was found growing in Cyprus by Mrs Kenyon and sent by her to Kew, whence Foster received rhizomes in 1885.

Diagnosis.

I. cypriana Pogoniris; *I. trojanae* haud dissimilis sed *folia* angusta, *spathae* latiores, breviores, fere omnino scariosae; *semina* elliptica vel pyriformia nec compressa.

Description.

Rootstock, a stout rhizome.

Leaves, ensiform, of a slightly glaucous blue-green somewhat like those of *I. pallida* but distinctly narrow for so large a plant.

Stem, about 3 feet in height, bearing a terminal head of 3 flowers, and 2—3 lateral heads each of at least 2 flowers, the lowest branch being the longest and bearing 3 flowers. The stem is often bent and unable to support itself erect.

Spathes, not more than 2 in. long, very broad and navicular, the outer valves being almost entirely scarious, the inner much less so.

Pedicel, extremely short.

Ovary, more equally six grooved than that of *I. mesopotamica*.

Tube, 1 in. long, light yellow-green, with faint broken purple stripes.

Falls, the elongated wedge-shaped blade narrows gradually to the broad wedge-shaped haft, which is veined with brown on a light ground. The blade is of a pale blue-lilac overlaid with a reddish shade and the prominent beard is white, slightly tipped with yellow in front, becoming almost wholly yellow at the base. The shape of the blade is peculiar, for the widest point is at the extreme end. 4½ in. by 2¼—2½ in.

Standards, the obovate blade is of a paler shade of lilac than the falls and the deeply channelled haft is dotted and veined with brown-purple, on the inner side.

Styles, paler than the standards except along the median ridge.

Crests, broad, triangular, serrate.

Stigma, entire.

Filament, colourless.

Anthers, cream.

Pollen, cream.

Capsule, pointed at the upper end and tapering also at the lower.

Seeds, pyriform or ellipsoid, not compressed.

Observations.

The true plant, as first described by Baker and Foster in the Gard. Chron. 1888, II. p. 182, is now very rare in cultivation. It appears, indeed, to be almost, if not quite, unknown in England, though I had the good fortune to find it last year in a garden in the south of France. Except that the stem needs some support to enable it to bear the weight of the huge flowers, it is one of the most decorative of all Irises. The flowers are of large dimensions and in the original plants were of a distinctly reddish-purple or lilac.

An unfortunate confusion has arisen owing to the fact that some plants were sent to Foster as *I. Junonia* in 1903 or 1904, which were only a blue-purple flowered form of *I. cypriana* and not true *I. Junonia* (see p. 174). Foster thereupon proposed to call his original *I. cypriana* *I. Junonia* var. *cypriana* owing to the priority of Kotschy's name. (Cf. Gard. Chron. for July 1st, 1905.)

Our knowledge of the plant is still very inadequate, and its true relation to such allies as *I. trojana*, *I. mesopotamica* and *I. Junonia* cannot at present be defined. The difficulty of working out the relationships of these plants lies in the fact that they need a warm climate and a heavy dry limestone soil, if they are to flower well and set seeds.

Moreover, they often suffer by reason of their habit of beginning to grow in the autumn, only to have the growths battered and broken, if not destroyed, by rough weather in the winter. The plants are then too feeble to flower in spring.

VI. The Oriental *Pogoniris*.

The three species of this group are characterised by spathes of a curiously membranous, almost transparent texture. By this feature they are easily distinguishable from the forms of *I. germanica* which are probably only found in Central Asia as escapes from cultivation. See p. 155.

- | | |
|---|-----------------------|
| (1) Stem unbranched; leaves very glaucous. | <i>I. scariosa</i> . |
| (2) Stem branched; spathes broad and much inflated; the outer leaves of each tuft very blunt and round. | <i>I. imbricata</i> . |
| (3) Stem taller with longer branches; spathes narrow and less inflated; falls with conspicuous veins that end abruptly at a straight line across the blade near the end of the beard. | <i>I. Alberti</i> . |

† *I. SCARIOSA*

Willdenow ex Link, Jahrb. I. iii. p. 71 (1820).

Ledebour, Fl. Ross. IV. p. 104 (1853).

SYNONYMS.

I. glaucescens, Bunge ex Ledeb. Fl. alt. I. p. 58 (1829).

•Ledeb. Ic. Fl. Ross. t. 102 (1830).

I. elongata, Fischer MSS. ex Baker in J. L. S. XVI. p. 144 (1877).

I. longiflora, Herbert ex Baker l.c.

I. Eulefeldti, Regel in Act. Hort. Petrop. v. p. 633 (1877).

•Gartenflora XXVII. p. 324, t. 954 (1878).

•Foster in Bot. Mag. t. 6902 (1886).

I. glaucescens, Bunge var. *Eulefeldti* Maxim. in B. A. P. XXVI. p. 534 (1880).

[N.B. Falk's *I. biflora*, Beitrage II. p. 101, no. 59 (1786), which came from the Kalmuck and Kirgish Steppes near the Volga and Ural rivers, is probably *I. scariosa* and not *I. aphylla*, for that river seems to form the dividing line between the two species. Since however the determination is uncertain, it seems best not to restore the name.]

DISTRIBUTION. The typical plant is found near the Caspian, and in the Altai region; *I. Eulefeldti* from Turkestan is apparently only a robust form.

Caspian Sea. No locality, 18—, Weidemann (B).

Altai Region. No locality, 18—, Ledebour (V).

„ „ 18—, Fischer (V).

R. Irtysch between Semipalatinsk and Koriakowo, 1840, Karelin and Kirilloff (K) (V) (BM).

Ustkamenorogorsk, 1911, Meyer (HortD).

Saisansk, 1911, Meyer (HortD).

R. Ischim, 18—, Schrenk (K) (V).

Turkestan. Sources of the Dschirgalan, 1879, Regel (BM) (B) (V).

R. Almaty, N.W. from Kuldsha, 1878, Regel (BM) (B) (V).

Diagnosis.

I. scariosa Pogoniris; *rhizoma* ut in *I. pumila*; *folia* glauca; *caulis* simplex; *spathae* angustae, acuminatae, 2-pollicares, membranaceae, apice scariosae; *tubus* plus quam pollicaris, fuscus.

Description taken from Foster's notes of specimens received in 1887, and collected by Bateson near Lake Balkhash.

Rootstock, a compact, short creeping, somewhat slender rhizome.

Leaves, 6—12 in. long at flowering time, about $\frac{1}{2}$ — $\frac{3}{4}$ in. broad, erect or but slightly falcate, pale green, very glaucous, 5—6 to a tuft.

Stem, about 2—6 in. long or slightly more, with two small clasping leaves at the base, above which it is bare, producing two flowers (but sometimes only one).

Spathe valves, 2—2½ in. narrow, pointed, clasping the tube, pale green, but transparent and membranous below, becoming scarious above, sharply keeled.

*Pedice*l, none, or very short.

Ovary, $\frac{3}{8}$ in. long, sharply trigonal, green.

Tube, 1—1½ in. long, purplish-brown.

Falls, obovate cuneate, the haft being marked with thick purple veins on a white ground with some colour diffused from the veins. The blade is of a uniform and peculiar red-purple colour with a few darker veins, becoming more prominent near the end of the beard, which is yellow on the haft and then white tipped with purple on the much reflexed blade. $1\frac{3}{4} \times \frac{5}{8}$ in.

Standards, obovate unguiculate, of a uniform red-purple, rather darker on the haft. $1\frac{1}{2} \times \frac{1}{2}$ in.

Styles, a lighter tint of the same colour.

Crests, small, lanceolate deltoid.

Stigma, entire, semicircular in outline.

Filaments, about equal in length to the anthers.

Anthers,

Pollen, white.

Capsule, trigonal, pointed.

Seeds, pear-shaped, brown, wrinkled, without any conspicuous aril.

Observations.

Willdenow's description¹ certainly does not agree with the plant that Pallas identified as *I. biflora* in the British Museum. This is evidently an example of *I. aphylla*, of which Pallas said (Iter. 1. p. 171) that he had never found specimens to the east of the Volga.

Willdenow's description does, however, describe the plant that is found beyond the Volga and which is distinguished by its long scarious spathes and extremely glaucous leaves. This last character was noticed by Bunge when he gave the plant the name of *I. glaucescens* and it is also characteristic of the more robust variety named by Regel *I. Eulefeldii*.

After a careful comparison of Foster's notes on specimens of *I. scariosa*, which came to him from the hills to the north of Lake Balkhash and on others of *I. Eulefeldii*, which he obtained from Regel, I have been unable to find any real point of difference between them except size. Moreover the points of resemblance are so many and so striking that it seems best to follow Maximowicz's arrangement of *I. Eulefeldii* as a robust variety of *I. scariosa*. The features in which they agree, besides the long, transparent and scarious spathes and the extremely glaucous leaves, are the brown-purple colour of the tube contrasting with the green ovary, the peculiar brown-veined purple flowers and the beard of long white hairs becoming on the blade purple at the upper end and on the haft bright yellow.

There is no record of the requirements of the plant in cultivation but the fact that, although Foster at one time cultivated both the type and the variety, neither seems to have remained long in our gardens, points perhaps to some difficulty in satisfying their needs. The plants that I have in cultivation grow slowly and are noticeable for their very glaucous leaves.

†† *I. IMBRICATA*

(FIG. 23)

*Lindl. Bot. Reg. XXXI. t. 35 (1845).

SYNONYMS.

I. sulphurea, C. Koch ex K. Koch, Linnaea XXI. p. 637 (1848).

**I. flavesccens*, Sweet in Ornament. Fl. Gdn. t. 252 (1854). (The confusion between *I. flavesccens* DC. and *I. imbricata* is very frequent.)

I. Tatschii, Foster ex Sprenger in Bull. Soc. Tosc. Ort. 1901, p. 328.

**I. obtusifolia*, Baker in Bot. Mag. t. 7701 (1900).

Lynch, Bk. of Iris, p. 134 (1904).

¹ Spathis terminalibus diphyllis bifloris scariosis maximis.

DISTRIBUTION. Transcaucasia and North Persia.

Caucasus, 18—, K. Koch (B).

1909 (HortD).

Mazanderan, 18—, Wells (HortD from Kew).

Diagnosis.

I. imbricata Pogoniris; *folia* luteo-viridia, glaucescentia, primigenia nonnunquam obtusa; *caulis* ramosus foliis subaequalis sesquipedalis; *spathae* membranaceae, inflatae, apice tantum et margine subscariosae, valva exteriori acute carinata; *segmenta* omnia pallide lutea; *capsula* rotundata.

Description.

Rootstock, a stout compact rhizome.

Leaves, broad, ensiform, pale yellowish-green, the outer leaves of each tuft being often very blunt and rounded at the tip (see Fig. 24).

Stem, 12—20 in. high, bearing a crowded compact inflorescence, the lateral buds being nearly sessile, each set in a ventricose navicular bract (cf. Fig. 23).

Spathe valves, very inflated and navicular, light green, membranous, hardly scarious even at the tip, 2—2½ in. long, the outer valve being sharply keeled.

Pedicel, very short.

Ovary, rounded hexagonal, with six shallow grooves, bright green, walls very thick.

Tube, about an inch long, bright green, faintly mottled with brown-purple spots.

Falls, obovate cuneate, of a greenish-yellow colour, veined with brown-purple on the haft and sometimes also on the blade. The beard is composed of stout densely set whitish hairs, tipped with bright orange.

Standards, the blade is a rounded oblong, narrowing sharply to the haft which is mottled with red-brown. The colour is the same greenish-yellow as the falls.

Styles, very broad, pale, semitransparent yellow, keeled.

Crests, almost quadrate, with a much serrated edge.

Stigma, entire, oblong.

Filaments, short, colourless or very pale yellow, sometimes tinged with faint mauve.

Anthers, white or very pale yellow.

Pollen, cream.

Capsule, 2 in. long, nearly circular in section, tapering gradually to either end.

Seeds, brown, wrinkled, compressed, with a faint, small, whitish aril.

Observations.

This yellow Iris from the Caucasus was apparently in cultivation in the time of Lindley but was confused with Redouté's *I. flavescens* from which it is easily separated by its membranous, inflated, green spathes, which at the flowering time are only slightly scarious towards the tip and edge, while those of *I. flavescens* are not inflated and are moreover nearly wholly scarious.

In certain conditions, possibly when the soil is deficient in lime, *I. imbricata* produces flowers in which the yellow colour is spoilt by dull, diffuse, irregular purple veins and blotches.

Fig. 24 represents three leaves of one tuft of this Iris. It will be noticed that the outermost is extremely blunt, while the other two are distinctly more pointed. *I. obtusifolia* was so named, probably from freshly imported material in which the central pointed leaves had not had time to develop. I have raised seedlings of the original Kew plants of *I. obtusifolia* and am unable to separate them from plants sent to me direct from the Caucasus or from seedlings raised from seed from the same source.

The distinction between *I. imbricata* and the yellow-flowered form of *I. Alberti* is somewhat difficult to determine. The plants look very different when growing side by side and yet it is hard to define the difference apart from the colour. On the whole, they may be separated by the following characters:—*I. imbricata* is the dwarfer plant and has the outer spathe valve keeled. The lateral branches are also very short so that the inflorescence is very crowded

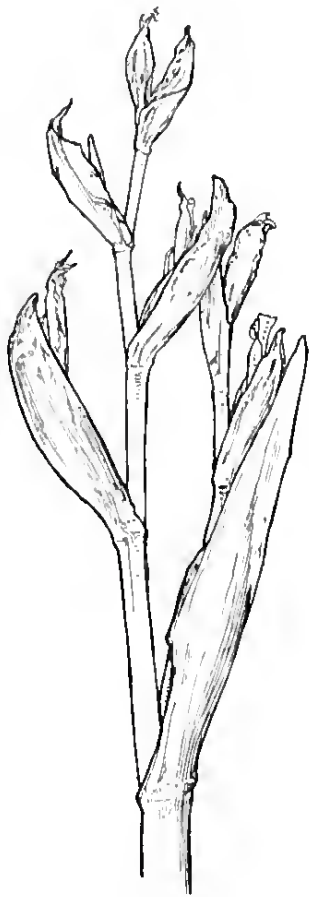


FIG. 23 Inflorescence of *I. imbricata*. About one-third or a quarter the natural size.

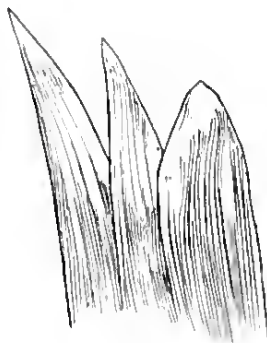


FIG. 24. Three leaves taken from the same tuft of *I. imbricata*; the bluntest is the earliest and outermost. About half the natural size.

(see Fig. 23). The hairs of the beard are yellow for their whole length and not bluish-white tipped with yellow as in *I. Alberti*. The filaments are not infrequently mauve.

††*I. ALBERTI*¹

(PLATE XXXVIII)

E. Regel in Act. Hort. Petrop. v. p. 260 (1877).

*Gartenflora XXIX. p. 33, t. 999 (1880).

Maxim. in B. A. P. XXVI. p. 535 (1880).

*Baker in Bot. Mag. t. 7020 (1888).

Hdk. Irid. p. 26 (1892).

DISTRIBUTION. The mountains of Turkestan near Wernoje (Verni) in the valley of the Almatinka, Wernoje, 1877, Fetissow (K).

Diagnosis.

I. Alberti Pogoniris; *I. imbricatae* similis sed *folia* sesquiplicia, *caulis* foliis longior, ramis longioribus; *segmenta* exteriora venis subito truncatis ornata; *spathae* membranaceae, inflatae, rotundatae.

Description.

Rootstock, a stout, compact, rhizome.

Leaves, broad, erect, somewhat glaucous, somewhat bluntly pointed, finally 18—24 in. by 1½—2 in., tinged with purple at the base in purple-flowered plants.

Stem, bears a terminal head of three flowers, of which the central bud is the last to open, and about three lateral heads each bearing 1—3 flowers. The peduncles are set in bract-like leaves.

Spathe valves, green, ventricose, not keeled, only slightly scarious at flowering time at the tip or along the margin.

*Pedice*l, very short.

Ovary, short, cylindrical, bright green.

Tube, about ½ in. long, greenish, becoming wider above.

Falls, obovate cuneate, the haft veined with thick, diffuse, reddish-brown veins, which extend on to the blade and there end abruptly at the end of the beard in a straight line across the width of the blade. The colour of the latter is either purple or pale yellow. The beard is of whitish hairs tipped with yellow and often ends in an obscure crest.

Standards, almost orbicular, the blade narrowing abruptly to a canaliculate haft, which is veined with reddish-brown. The colour is the same as that of the falls.

Styles, 1—1½ in. long.

Crests, short, subquadrate, overlapping, reflexed, with a serrated upper edge.

Stigma, large, oblong.

Filaments, longer than the anthers, white.

Anthers, short and comparatively broad.

Pollen, white.

Capsule, short, broad, globose, showing hardly any trace of ribs or grooves, with very thick walls.

Seeds, brown, semicircular, wedge-shaped, resembling those of *I. pallida*.

Observations.

This species was placed by Baker among his group of Pseudevansias. The rudimentary crest, on which he based this classification, is in many individuals so slightly marked, even if present at all, and the plant is in other respects so different from the other members of that group that it would seem wiser to keep it among the Pogoniris. I feel the more justified in adopting this plan because among numbers of seedling Pogoniris I have found many with a distinct crest beyond the tip of the beard. The amount of crest varies in different flowers on the same plant and even on the different falls of the same flower. In some cases I have noticed a good half inch of crest beyond the extremity of the beard, and it is not unusual for the hairs of the latter to be inserted on a distinctly raised ridge.

I. Alberti is a plant of a curious habit of growth, but even here it resembles the larger members of the Pogoniris group rather than the Pseudoregelias, such as *I. kumaonensis* or *I. Hookeriana*.

The original type of this Iris was purple-flowered, but I have obtained more than one yellow-flowered plant in raising the species from seeds. The latter are semicircular and compressed like those of *I. pallida* and quite different from the Pseudoregelia type.

I. Alberti does best in a warm position, where it is fairly dry in winter. Foster used to give it the same treatment as the Oncocyclus group. This is however not necessary, for I still grow a plant of this Iris, which he gave me and which has not received any special treatment.

¹ Named after Dr Albert Regel, by whom it was discovered in the mountains of Turkestan.

A characteristic feature of the plant is the abrupt termination of the veining on the falls which ends at a straight line drawn across at the end of the beard. For other points of difference between *I. Alberti* and *I. imbricata* see the Observations on the latter (p. 180).

This same venation is present in a plant which came from Shelford but whose history is unknown. The colour is a pearly grey with the characteristic dark veins, and this Iris must clearly be a variety or hybrid of *I. Alberti*. It is distinguished also by its habit of flowering more than once in the year at irregular intervals.

VII. The Indian Pogoniris Group.

The bearded species of Iris from Northern India and Afghanistan form a puzzling group. Several of them, for instance, *I. kashmiriana* and its rare lavender-purple form, are difficult to cultivate in England and it is, moreover, impossible to feel sure that any are really wild plants and not escapes from formerly cultivated areas. These Irises, and especially the white-flowered varieties, are very commonly planted on graves—a custom which provides endless opportunities for the escape of the plants into semi-wild conditions.

Moreover, plants that I have received in recent years from Srinagar in Kashmir and Khatmandu in Nepal have proved to be forms of *I. germanica*¹, identical in the first case with that which Foster named var. *Kharput* after the town in Asia Minor from which it was sent to him, and in the second with the variety *atropurpurea*, as it is commonly grown in gardens in England and in a semi-cultivated condition in the South of France.

No explanation of this very wide distribution has been given, but I am told by an eminent Anglo-Indian botanist that there are in Kashmir several plants which seem to have been introduced there from Western Asia through the passes, which were for so many centuries practically the only route to India from the West.

With regard to the actual nomenclature, I have hesitated to adopt the name *I. deflexa* Knowles and Westcott because in the first place that plant is only vaguely said in the original description² to have been introduced from the East, while in the second I am unable to identify the figure of the plant given by its authors with either of the plants that are known to grow in India. It is true that the flower is not unlike that of *Kharput*, but this identification is rendered uncertain by the statement that *I. deflexa* needed greenhouse culture to ensure successful flowering, whereas *Kharput* is easy to cultivate and flowers readily.

Another problem is presented by the specimens in Griffith's herbarium, nos. 5904 and 5915, which Baker described as *I. Griffithii*. These are remarkable for their very long perianth tube, which makes it inadvisable to identify them with any other species, and yet it is remarkable that this species should have remained otherwise entirely unknown.

Wallich's *I. nepalensis*³, of which specimens are preserved in his herbarium now at the Linnaean Society, was almost certainly an *I. germanica* (cf. p. 163), although there is perhaps scarcely enough evidence to enable us to identify it with absolute certainty with the plant which has been already mentioned as common in Khatmandu, because an early drawing from an Indian source in the Kew Collection represents an Iris with flowers of a much paler colour.

The Indian species of Pogoniris may be separated as follows⁴:—

A. Probably not indigenous; spathes scarious in the upper half.

1. Flowers large and flimsy, of a reddish-purple with standards of a much lighter shade than the falls; the young leaves slightly but distinctly edged with purple. *I. germanica* var. *Kharput* (see p. 163).
2. Flowers of a uniform deep red-purple, the standards being almost, if not quite as dark as the falls. *I. germanica* var. *nepalensis* (see p. 163).

B. Probably indigenous; spathes green or at least only scarious at the extreme edge and tip.

1. Stem branched. *I. kashmiriana* (p. 182).
2. Stem unbranched. *I. Griffithii* (p. 184).

† *I. KASHMIRIANA*

Baker in Gard. Chron. 1877, II. p. 744.

Hdk. Irid. p. 38 (1892).

SYNONYMS.

I. Bartoni, Foster in Gard. Chron. 1883, I. p. 275.

*Baker in Bot. Mag. t. 6869 (1886).

¹ Cf. also such specimens as those obtained by Duthie's collector in 1901 from Nagbal, no. 25787 (K) (E), Liddar Valley, no. 25970 (K), and Naidkahi, no. 25792 (K).

² Knowles and Westcott, The Floral Cabinet, II. p. 19, t. 51 (1838).

³ Cat. no. 5050.

⁴ The list here given includes those plants which are common in Northern India, but, as has been already explained, it is at least doubtful whether several of them are not importations from the West.



XXXXII

Iris Alberti

DISTRIBUTION. Kashmir and the immediate neighbourhood. It was discovered by Dr Aitchison and sent by him to Kew. It is grown apparently on graves (cf. Aitchison MS. (K)) and it is therefore uncertain whether it is really a wild plant and a native of Kashmir.

- Kashmir.* Kashmir Valley at 11,000 ft, 1875, Aitchison (K).
 Jhelum Valley near Perni, 1892, Duthie, no. 10920 (K).
 Baramoula, 18—, Jacquemont, no. 3371 (K).
 Bandipur, 1876, Clarke, no. 5150 (K).
 Liddar Valley, 1901, Duthie's collector, no. 25976 (K), no. 25793 (E).
 Nagbal, 1901, Duthie's collector, no. 25788 (K).
 Srinagar, 1908 and 1910, Harrison (HortD).
Chitral. Jambatai, 1895, Harris, no. 16677 (K) (BM).
N.W. Frontier Province. Abbottabad, 1909, Lorne Campbell (HortD).
Beluchistan. Quetta, 1910, Keyes (HortD).
Afghanistan. Kabul, 1880, Collett, no. 68 (K).

Diagnosis.

I. kashmiriana Pogoniris; *caulis* ramosus, *foliis* longior; *spathae* herbaceae; *segmenta* omnia alba vel pallide purpurea, interiora parce barbata.

Description.

Rootstock, a stout rhizome.

Leaves, glaucous, striated, 15—20 in. long, of a yellowish-green.

Stem, about 2 ft long, with a terminal head of three flowers and one or two side branches with 1—2 flowers each.

Spathe valves, pointed, slightly ventricose, persistently green, the outer valve keeled, only very slightly scarious at the tip, 3—4 in. long.

Pedicel, not more than $\frac{1}{4}$ — $\frac{1}{2}$ in. long.

Ovary, 1 in. long with three larger and three smaller grooves.

Tube, about 1 in. long, light green, rounded trigonal.

Falls, obovate cuneate; the haft marked with greenish-yellow veins on white reaching to the end of the beard, which is white in front, becoming tipped with yellow towards the base; the blade of a somewhat creamy white, not so pure as in *albicans*, sometimes slightly tinged with blue and extending almost horizontally.

Standards, white, faintly veined with yellow on the short haft and at the base of the blade. The canaliculate haft bears three or four whitish hairs, sometimes very short and almost indistinguishable.

Styles, cream coloured, keeled, gradually becoming slightly broader.

Crests, large, triangular, overlapping, especially along the keel of the styles.

Stigma, entire.

Filaments, cream, equal in length to anthers.

Anthers, cream, narrow.

Pollen, cream.

Capsule,

Seeds,

Fragrance, very marked and quite distinct, somewhat like that of the lemon-scented verbena.

Observations.

This Iris is very distinct and yet, owing to some weakness in its constitution, which does not allow it to thrive in England, it is imperfectly known. My experience of it has been that newly imported rhizomes grow well and flower once and then the plant either dies altogether or becomes very weak and refuses for years to make any vigorous growth. I have consequently been unable to obtain seeds of this Iris, which would seem to be a possible means of raising plants that would succeed here. A hybrid of this Iris, known in commerce as the Shelford variety, was raised by Foster but there is no record of the pollen parent. It is perhaps the best white garden Iris, but like the wild plant it is sometimes liable to collapse unaccountably and probably needs warmer conditions than it usually obtains here. It is distinguished from the wild species by the narrower, more rigid and less markedly ribbed leaves, by the less widely branching stem and by the colour of the flowers, which are of a less milky white.

Of the other white Irises in cultivation, *I. kashmiriana* is most likely to be confused with *I. florentina* and *I. albicans*. From the latter it is at once distinguished by its more widely branching stems and by the fact that its standards always bear a few hairs on the inner side near the base. These never occur in *I. albicans*, though they are always present in *I. florentina*. From this latter, however, *I. kashmiriana* may be distinguished by persistently green spathes, by its broad, yellow-green, ribbed leaves, by the stiffly spreading and not drooping falls, and by the milk-white flowers.

I am inclined to believe that this Iris is the albino form of a pale mauve-purple Iris, which has more than once flowered imperfectly with me, but the whole question needs further investigation with fresh material from Kashmir¹. In this connection, a warning may be given that the common

¹ Cf. Aitchison's no. 24 from Kashmir (K), a fruiting specimen of the "pale mauve kind."

purple Iris that apparently grows freely in Srinagar is not this possible purple *I. kashmiriana* but the form of *I. germanica*, which Foster named *Kharput*, after the town in Asia Minor from which it was first sent to him (see p. 163).

There seems no good reason for separating from *I. kashmiriana* Foster's *I. Bartoni*. The yellow-green ribbed or striated leaves, the green spathes, the bearded standards and the thick, somewhat flattened stem are all characteristic of *I. kashmiriana*, which moreover is not mentioned by Foster in his description and notes of *I. Bartoni*. The latter he described from plants obtained from Kandahar in 1880 by Colonel Barton, who was informed that the rhizomes came from the ancient ditch surrounding the ruins of the old town, which are situated at a distance of four miles from the present site. Obviously the plant was growing in Kandahar in a semi-cultivated state, and the fact that it flourished in the damp soil of a ditch also agrees with what we know of *I. kashmiriana*.

The typical *I. Bartoni*, which I have grown and flowered and compared with Foster's MS. notes, has a very long beard (1 in.) on the haft of the standards, but I find that Foster records (MS.) that, in some plants that flowered in 1885, the hairs on the standards were "much less developed," "hardly visible often."

It should be noticed that the Botanical Magazine figure of *I. Bartoni* does not show any purple markings on the blade of the falls. These occur on the typical plant but, as Foster records in his notes, they are variable. I have noticed similar variations in plants of *I. kashmiriana* which I have received direct from Kashmir.

I. GRIFFITHII

Baker in Hdk. Irid. p. 32 (1892).

DISTRIBUTION. Afghanistan.

Afghanistan, 18—, Griffith, nos. 421 and 5915 (K).

Kafiristan, 18—, Griffith, no. 5904 (K).

Diagnosis.

I. Griffithii Pogoniris; *planta* nana; *caulis* simplex; *spathae* herbaceae; *tubus* elongatus.

Description.

Rhizome, resembles that of a small Pogoniris.

Leaves, 6—12 in. long and slightly over an inch broad at the widest part.

Stem, 6—8 in. unbranched, bearing a reduced leaf below the centre.

Spathes, lanceolate, green, 3 in. long.

Pedicel, none.

Tube, 1½—2 in.

Flowers, apparently purple.

Observations.

These plants agree with the other Pogoniris of North-West India in having long, narrow, green spathes. *I. Griffithii* is, however, easily distinguished from *I. kashmiriana* by its short, unbranched stem.

THE NEPALENSIS SECTION

This contains either one or two species, which are at once separated from all other Irises by their remarkable rootstock (Fig. 25, p. 185), which is not unlike that of a Hemerocallis. For the discussion of the claims of *I. Collettii* to specific rank, see the observations on that species and on *I. nepalensis*.

†† *I. NEPALENSIS*

(PLATE XXXIX)

D. Don, Prod. Fl. Nep. p. 54 (1825) non Wallich.

• Sweet, Brit. Fl. Gdn. Ser. II. vol. I. (vol. IV.), no. 11 (1829).

• Royle, Illustr. Bot. Him. t. 90, fig. 2 (1839).

Baker in J. L. S. XVI. p. 143 (1877).

Hdk. Irid. p. 22 (1892).

Collet, Fl. Siml. p. 515 (1902).

SYNONYMS.

I. decora, Wall. Pl. As. Rar. I. p. 77, t. 86 (1832).

I. sulcata, Wall. MS. Catalogue no. 5049 (K).

I. fasciculata, Jacquemont MS. (K).

I. yunnanensis, Léveillé in Fedde, Repert. Nov. Sp. VI. p. 113 (1908).

Neubeckia decora et sulcata, Klatt in Linnaea XXXIV. pp. 588—90 (1866).

DISTRIBUTION. From the Western Central Himalaya into Yunnan.

Bashahr; Shinach to Bhagaut, 1891, Lace (E).
 Darma; Mulagudh, 1886, Duthie (E).
 Garhwal; Pindar Valley, 1846—49, Strachey and Winterbotham (K) (BM).
 Kumaon; Kali Valley, 1886, Duthie, nos. 6021 and 6022 (K).
 Dhaul Valley, 1887, Duthie, no. 6023 (BM) (K).
 N. W. Himalaya, 18—, Thomson, no. 1080 (B).
 Simla, 18—, Jacquemont, no. 1023 (K) (P) (B).
 1831, Lady Dalhousie (K), C. B. D. (E), 1907 (HortD), 1885, Collett (K).
 Nepal, 1821, Wallich, no. 5049, sub nom. *sulcata* (K).
 Kanawar, 1847, Hb. Hooker (K).
 Deobun, 1844, Edgeworth (K).
 Khasi Hills, 18—, Hooker f. and Thomson (BM) (B).
 18—, Hb. Griffith, no. 5918 (K).
 188—, Clarke, no. 43643 (K).
 Shillong, 1885, Clarke (K) (BM).
 Sikkim; above Choongthang; 6500 ft. 1885, Pantling (K).
 Bhutan, 18—, Griffith, no. 5918 (K).
 Yunnan, 1905, Ducloux, no. 350 (P) (L).
 Yunnan; Mengtzi, 18—, Henry, no. 10775 (K).
 Yunnansen, —, Maire, nos. 85 and 1533 (E).

Diagnosis.

I. nepalensis; *radix* fasciculata, tuberibus pluribus, carnosus, more Hemerocallidis composita; *folia* glauca, basi fibrillis dense vestita, costa media conspicua; *scapus* subpedalis, nonnunquam ramosus; *tubus* 1—2 pollicaris; *segmenta* interiora reflexa.

Description.

Rootstock, a small flattened rhizome, hidden in the fibrous remains of old leaves and having attached to its under side in the resting state a number (six or more) of stout whitish fleshy roots, sometimes tapering gradually and sometimes swollen near the tip (Fig. 25).

Leaves, linear-ensiform, acuminate, glaucous at the base, ribbed; about 12 in. long at flowering time and afterwards increasing to 18—24 in. by $\frac{1}{2}$ in. The central rib is prominent on one face and two ribs on the other.

Stem, about a foot or 18 in. long, but sometimes less, bearing a terminal head of 2—3 flowers and often one or more side branches; it also bears 1—2 reduced leaves near the base.

Spathes, usually 2-flowered, long, narrow, acuminate, keeled, green.

*Pedice*l, $\frac{1}{2}$ in. or less to 1 in. long.

Ovary, trigonal with slightly concave sides.

Tube, $1\frac{1}{2}$ — $2\frac{1}{2}$ in. long, slender.

Falls. The broadly lanceolate blade is hardly separated by any constriction from the cuneate haft; 2 in. long by 1 in. wide. The colour is a pale lavender violet produced by pale violet veins on a white ground. On the haft the veins are of a distinctly reddish purple colour. The central ridge is prominent and much waved and sometimes topped with a few threadlike processes. At the base it is yellowish brown, passing to yellow at the centre and finally to a pale mauvish white on the blade.

Standards, lanceolate, narrower than the falls and drooping outwards at the same angle; pale violet with indistinct deeper veins.

Styles, pale violet with irregularly indented edges.

Crests, large, triangular, standing erect above the falls and standards.

Stigma, deeply bilobed.

Filaments, slender, white, faintly tinged with violet.

Anthers, cream, tinged with violet at the base.

Pollen, white.

Capsule, 1 — $1\frac{1}{2}$ in. long, trigonal, tapering to a point at the apex, with deeply grooved sides.

Seeds, small, rounded, dark brown, each with a whitish strophiole as large as, or larger than, itself.



FIG. 25. Rootstock of *I. nepalensis*. Slightly reduced.

Observations.

This little-known Iris has been the cause of much confusion. In his original description Don places it under the heading "Flores barbatae" but makes no further mention of any beard. As a matter of fact

there is not really a beard although the much crinkled crest is surmounted here and there by a few thread-like processes.

The chief peculiarity of *I. nepalensis* is to be found in its rootstock, which in the resting state consists of a bundle of fleshy roots, often swollen out towards their extremities and bearing a considerable resemblance to the rootstock of a *Hemerocallis* (cf. Fig. 25, p. 185). These roots are attached to a small hard disc, surrounded by the fibrous remains of old leaves, from the centre of which the new growths emerge.

The exact relationship of *I. Collettii* to the typical plant is not yet established, although the evidence that has accumulated tends to weaken its claim to specific rank. Unfortunately I have never yet seen *I. Collettii* in flower, though I believe that I now possess specimens from Yunnan, which I owe to the kindness of the Abbé Ducloux. The typical *I. nepalensis* seems to differ from *I. Collettii* in its taller growth, its glaucous narrow leaves and in the structure of the latter. These in the type bear on one side a single prominent central rib, and on the reverse two similar ribs, one on either side of the centre. In *I. Collettii* the leaves of the non-flowering tufts are broader and have two ribs on one side and three on the other of the leaves.

Moreover, *I. Collettii* appears to be far more floriferous. Two or more stems, which are sometimes very short and sometimes 2—3 in. long, rise close together, and the spathes usually produce two and sometimes three or even four flowers.

In cultivation it was Foster's experience that *I. Collettii* was easier to manage than *I. nepalensis*, which stands entirely apart from all other Irises in its needs. True to its habits in its native home, *I. nepalensis* lies dormant for six months during the time when the dry N.E. winds would be blowing and only grows during the period of the heavy rains of the S.W. Monsoon. Thus even in England the leaves die down late in October and do not appear again until April or May. When growth once begins it is rapid, and the plants are usually in flower during the latter part of June or the first half of July. The individual flowers are very shortlived and do not last more than twelve hours unless the weather is very dull and cool. Since this is so, there is less likelihood of pollination being effected by insects, and if it is desired to obtain seeds it is best to pollinate the flowers artificially. Capsules then form readily and seeds are produced in abundance.

The seeds should be sown in the autumn rather thinly in large pots, which may be treated in the same way as pots of other Iris seeds (see p. 235). Germination, however, will not take place until April or May, and care must be taken that the soil is not allowed to become too dry at that time. The young plants should be kept well supplied with water throughout the summer and should be allowed to remain in the pots. When the leaves turn yellow water should be withheld, and the young plants can then be shaken out of the soil and stored in dry sand for the winter. It will be found that each has formed from one to three of the tuberous fleshy roots.

The old plants should also be lifted and stored in dry sand when the leaves wither in autumn, and, together with the seedling plants, they should be planted out in March or April in rich, moist soil. I incline to think that they do better in a position where they are shaded during part of the day than in an entirely open situation.

I. COLLETTII

*Hooker, fil. in Bot. Mag. t. 7889 (1903)¹.

SYNONYMS.

I. nepalensis forma *depauperata*, Collett and Hemsley in J. L. S. XXVIII. p. 136 (1890).

I. nepalensis var. *Letha*, Foster in Gard. Chron. 1892, II. p. 458.

I. Duclouxii, Léveillé in Fedde, Repert. Nov. Sp. VI. p. 113 (1908).

DISTRIBUTION. North Burma, Siam and Yunnan.

Burmah; Shan Hills, 1888, Collett, no. 765 (K).

Upper Burmah; Fort White, 1891, Stone (Foster MS.) (K).

[¹Fort White is situated on a spur of the Northern Chin Hills called the Letha Range.]

Siam; Chengmai, Doi Sooteh, 1909, Kerr (1600—2500 ft.) (K) (B).

Yunnan, no locality, 1887, Delavaye, no. 2684 (P).

Mongtse, 1893, Tanaut (P).

Sen-Tchong-chan, 1905, Ducloux, nos. 349 and 820 (P) (L).

Eastern Flank of Lichiang Range, 1906, Forrest, no. 2205 (K) (E).

Tali Range, 1906, Forrest, no. 4840 (E).

Yunnan-sen. —, Maire, 1532 (E).

Yunnan-fu, 1909, Ducloux (HortD).

Eastern Flank of Lichiang Range, 1910, Forrest, nos. 5654 and 5929 (E).

Diagnosis.

I. Collettii *I. nepalensi* valde similis sed *folia* saturate viridia nec glauca, *scapus* multo brevior, nonnunquam omnino obsoletus.

¹ A mistake was made in the Bot. Mag. description, which gave the tube as short, for the specimens (K) from which the plate was prepared have a tube of more than 1 in. long and they agree with Collett's original specimens.



XXXIX

Iris nepalensis

The description of this Iris agrees with that of *I. nepalensis* except in the following points.

Leaves, broader, not so glaucous and of a darker green; the conspicuous ribs number two on one side and three on the other. *Stems*, very short in most cases, but sometimes 2 in. long, several being often produced from the same rootstock.

[N.B. I do not understand Forrest's note "Pistil orange" on his no. 2205 (E). It may be a mistake for the orange yellow crest on the falls.]

Observations.

This Iris has been said to differ from *I. nepalensis* in its broader leaves of a deeper green and less glaucous colour and in the shorter stems. On the whole, I am inclined to doubt whether there are really two species. The variations shown in some specimens are so great that there is considerable difficulty in determining the point where *I. nepalensis* stops and *I. Collettii* begins.

For instance, the Doi Sootep specimens have in one case leaves 4 in. long by $\frac{1}{4}$ in. wide, and in another leaves of 16 in. by $\frac{7}{8}$ in. Again, Duthie's no. 6023 from the Dhauli Valley in Kumaon has one specimen with a stem that has two lateral branches, which if the internodes were reduced would approximate closely to *I. Collettii*. Moreover, the stems of Griffith's 5918 from Bhutan and Pantling's Sikkim specimens from Choonthang vary in length from 3 in. unbranched to 12 or 20 inches with several lateral branches.

I have been unable to separate from Collett's plant that which Foster described in the Gard. Chron. 1892, ii. p. 458 as *I. nepalensis* var. *Letha*. Evidently Foster was unaware that Collett and Hemsley had already published a description of the plant as a weak-growing form of *I. nepalensis*.

THE JUNO SECTION

This section contains those Irises whose rootstock is a bulb and whose bulbs in their resting state have attached to them several (usually about 4 or 5) thick fleshy roots. These remain unbranched until the autumn, when the rains commence in their native homes, and then send out many lateral rootlets, forming the support of the plant during the flowering season. In the drawing of *I. alata* (Plate XL) the brown roots represent those that remained attached to the bulb during the previous summer, while the newer lateral branchlets are white. There can also be seen at the base of the bulb two short thick white growths, which represent the beginnings of the next year's roots.

Other features characteristic of the members of the group are the deeply channelled or folded leaves and the small spreading processes that correspond to the standards in other Irises. It is convenient to keep the term "standards" in the case of these Irises, even though it may be somewhat paradoxical to give this name to parts of the flower that either extend horizontally or even actually hang down¹.

The Juno Irises also stand entirely apart from all other groups in the possession of spherical pollen grains, covered with a number of finely sculptured bosses or plates that are roughly pentagonal in outline. In two cases, *I. alata* and *I. palestina*, these bosses, if present at all, are very indistinct, and the pollen grains are further differentiated by being thickly covered with minute colourless spines. Hitherto, I have been unable to find any pores or to discover in what way the pollen tubes emerge from the grains. Immersion in liquid generally causes the bosses to detach themselves from the pollen grain and they can then be stained for examination under a high power. They are then seen to consist of an irregular network, made up of a concretion of minute spherical grains arranged in lines.

It is a rough general rule that the larger the plant the smaller is the number of the bosses on the pollen grains, but beyond this point this character hardly helps towards the differentiation of species. The numbers of the bosses on each grain are as follows: *I. bucharica* 8, *I. orchioides* 8—10, *I. Warleyensis* 8, *I. sindjarensis* 12, *I. Willmottiana* 12, *I. persica* 16, *I. pirsind* (= *I. persica purpurea* × *I. sindjarensis*) 16, *I. Rosenbachiana* 20.

Cultivation.

As we might expect of plants whose home is in the drier regions of Southern Europe and Asia, all the members of the Juno group need a thorough rest in summer, and it is because this absolute rest is not easily provided in our moist climate that some of the less sturdy species prove difficult to keep.

As a general rule all Juno Irises seem to prefer a stiff soil to one of mere sand, though the more vigorous species such as *I. bucharica* and *I. orchioides* flourish amazingly in warm well-enriched sand. The smaller species especially, such as *alata*, *palestina* and *persica*, seem to be more exacting in their demand for a heavy soil, and it is precisely because our summers are not often hot enough or dry enough to cut off all moisture from the bulbs in summer, and because it is almost impossible to lift them uninjured from stiff soil and so give them an artificial rest, that these small species prove more difficult than some others.

¹ The more correct expressions "inner and outer perianth segments" are too cumbersome for constant use.

Propagation.

When a Juno Iris has flowered, more than one new bulb is usually formed, but in most cases the increase is much less rapid than with the *Xiphion* Irises. There are exceptions, however, and *I. bucharica*, *I. sindjarensis* and *I. orchidioides* increase very rapidly by means of offsets in favourable positions.

Another method of increasing a stock of Juno Irises would probably consist in lifting the bulbs and taking off from each one or two of the fleshy roots. For I have noticed that when roots have been accidentally broken off at lifting time and kept until the autumn, there appears on each one a minute bud, which probably in a more genial climate than ours would develop into a bulb. I find too that Herr Siehe in his paper on the Asia Minor species¹ hints at the possibility of this method of increase. Experience has, however, shown it to be unsuccessful in England.

The process of raising Juno Irises from seed is somewhat lengthy, for the young plants take at least four, and often more, years to reach flowering size (see also p. 236).

Classification.

Hitherto the Juno section has been left undivided, or at most separated into groups of dwarf and tall plants. This, of course, was not satisfactory, for the terms are only relative.

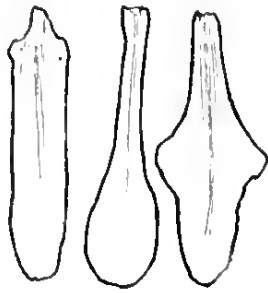


FIG. 26. The three types of outer segment in the Juno section.

Fortunately further knowledge of the living plants has shown that there are at least three well-marked groups within the section, which may be distinguished by the shape of the falls (cf. Fig. 26). Moreover, the seeds of each section are peculiar.

The first and most numerous section has winged falls and either spherical or pyriform seeds; the second has falls with an oblong haft narrower than the blade and cubical, compressed seeds; the third has oblong hafted falls with a small blade and seeds with a conspicuous aril.

The fact that, although the species of each group will hybridise with one another, no hybrid between members of different groups has yet appeared, seems to indicate that these groups follow the lines of natural division,

Analytical Key to the Juno Section.

- | | | |
|-----|--|--|
| | { Outer segments (falls) bearing lateral wings, seeds spherical or pyriform without any conspicuous aril. | 1. |
| | { Outer segments (falls) not winged but with a strap-shaped haft, seeds either cubical or with a conspicuous aril. | 9. |
| 1. | { Stem not produced. | 2. |
| | { Stem produced. | 4. |
| | { Leaves broad, falcate at flowering time; pollen grains covered with spines. | 3. |
| 2. | { Leaves narrow, erect at flowering time; pollen grains covered with a pentagonal network. | <i>I. persica</i> (p. 189). |
| | { Pubescence on the central line of the falls composed of simple hair-like processes, only slightly if at all thickened at the apex. | <i>I. alata</i> (p. 193). |
| 3. | { Pubescence composed of hair-like processes, each surmounted by an almost spherical boss. | <i>I. palestina</i> (p. 195). |
| | { Central ridge on the haft and blade of the falls splitting into hair-like threads. | <i>I. Tubergeniana</i> (p. 196). |
| 4. | { Central ridge not splitting into threads. | 5. |
| | { Leaves with a conspicuous, white, horny edge. | 6. |
| 5. | { Leaves without any conspicuous, white, horny edge. | <i>I. sindjarensis</i> (p. 196). |
| | { Stem tall, slender, bearing a few narrow, widely separated leaves. | <i>I. Auchisoni</i> (p. 198). |
| 6. | { Stem dwarfer, stout, closely set with broad leaves. | 7. |
| | { Flowers conspicuously blotched; leaves very broad and glossy. | <i>I. Willmottiana</i> (p. 198). |
| 7. | { Flowers not conspicuously blotched. | 8. |
| | { Flowers yellow. | <i>I. caucasica</i> ² (p. 199). |
| 8. | { Flowers lilac or purple. | <i>I. Stocksii</i> ² (p. 201). |
| | { Seeds more or less cubical without conspicuous aril (see Plate XLVIII, Fig. 6). | 10. |
| 9. | { Seeds globular or pyriform with conspicuous aril (see Plate XLVIII, Fig. 14). | 14. |
| | { Outer tunics of the bulb a dark olive green. | <i>I. Fosteriana</i> (p. 201). |
| 10. | { Outer tunics of the bulb a pale brown. | 11. |

¹ See ABZ. 1905, p. 113.

² This diagnosis of *I. caucasica* and *I. Stocksii* is unsatisfactory, but until living plants of *I. Stocksii* are obtainable, it seems impossible to separate the two species in any other way.

- | | | |
|-------------------|--|-----------------------------------|
| 11. | { Horny edge of the leaves inconspicuous. | <i>I. orchioidea</i> (p. 203). |
| | { Horny edge of the leaves conspicuous. | 12. |
| 12 ¹ . | { Flowers white and yellow. | <i>I. bucharica</i> (p. 203). |
| | { Flowers blue or purple. | 13. |
| 13 ¹ . | { Plant slender; the haft of the falls expanding suddenly into an oval or suborbicular blade; flowers deeply coloured. | <i>I. Warleyensis</i> (p. 204). |
| | { Plant stouter; the haft expanding more gradually into the oval blade; flowers paler in colour. | <i>I. coerulea</i> (p. 205). |
| 14. | { Stem not produced. | <i>I. Rosenbachiana</i> (p. 206). |
| | { Stem produced. | 15. |
| | { Leaves not falcate; seeds with circular aril as in the Oncocyclus Section. (Plate XLVIII, Fig. 8.) | <i>I. linifolia</i> (p. 207). |
| 15. | { Leaves very falcate; seeds with large white aril or strophiole running nearly half round the circumference as in <i>I. Rosenbachiana</i> . (Plate XLVIII, Fig. 14) | <i>I. drepanophylla</i> (p. 208). |

Other species will be found at p. 209, which are not sufficiently well known to allow them to be placed with certainty in any group.

† *I. PERSICA*

Linn. Spec. Plant. ed. I. p. 39 (1753).

*Bot. Mag. t. I. (1787).

*Gaertn. Carp. t. 13 (1805).

*Red. Lil. iv. t. 189 (1808).

*Drapiez, Herb. Amat. de Fl. iv. t. 376 (1833).

*Eden Album, t. 83 (36) (1872—1881).

Boissier, Fl. Or. v. p. 121 (1884).

Gard. Chron. 1890, i. p. 577.

*Foster; Bulbous Irises, pp. 31, 74, figs. 20, 21 and 50 (1892).

SYNONYMS.

Coresantha persica, Alef. BZ. xxi. p. 298 (1863).

Iris praecox, Salisb. Prod. p. 45 (1796).

**Juno persica*, Tratt. Auswahl, no. 84 (1821).

For an account of the varieties see pp. 190—192.

DISTRIBUTION. Eastern Asia Minor and Persia.

Pontus. Amasia, 1889, Bornmüller (BM) (V) (B).

Cappadocia. No locality, 1834, Montereux (K).

18—, Aucher Eloy, no. 2132 (K) (BM).

Kurdistan. Near Euphrates, 1836, Chesney (K).

1879, Danford (K).

Marash, 1908, (HortD).

N. Syria. Aleppo, 1867, Haussknecht (BM) (K) (B).

1888, Sintenis (K) (B).

Armenia. Van, 1899—1900, Maunsell (BM).

Persia. Mt Elwend, 1895, Strauss (K).

Murghab, 1868, Haussknecht (K) (BM) (B).

Diagnosis.

I. persica Juno; acaulis; *segmenta exteriora* alata sed folia multo angustiora quam in *I. alata*; *pollen* umbonibus pentagonis obtectum.

Description.

Rootstock. An ovoid bulb with membranous coats, the outer being brown, and with several fleshy roots, persistent in the resting state.

Leaves, four or five to a tuft, linear complicate, almost erect. About 2 or 3 in. long at flowering time, becoming finally about 6 in. long, with a white, obscurely ciliated edge.

Stem, extremely short, bearing usually one, but sometimes two flowers.

Spathe valves, nearly colourless with a few green veins, especially towards the top, narrow, 2—3 or more inches in length, one-flowered.

Pedicel, very short.

Ovary, cylindrical.

Tube, usually 2—3 inches in length but somewhat variable.

Falls. The haft bears a median ridge of yellow or orange, on which are usually about three rows of black dots, on either side of which the colour is a pale bluish green. In its upper part the haft

¹ The question of the claims of *I. bucharica*, *I. Warleyensis*, *I. coerulea* and possibly also of *I. orchioidea* to specific rank is still unsettled. They may eventually prove to be forms or hybrids of one or two species.

expands into two almost colourless triangular wings or flanges, which curve upwards and embrace the style. The blade is of a rounded oblong shape, marked with the conspicuous orange ridge and a dark blotch of black or brown purple, 2—2½ in. long by ½ in. broad, of a pale greenish blue.

Standards, about ¾ in. in length, horizontal or depressed with a canaliculate haft and three more or less distinct teeth, that in the centre being much the longest, white shaded with pale blue.

Styles, about an inch long, pale blue green.

Crests, large, almost quadrate with a coarsely toothed outer edge.

Stigma, oblong, entire, with a finely crenate edge.

Filaments, white, twice as long as the anthers.

Anthers, white.

Pollen, white, spherical, each grain bearing about 20 hexagonal bosses.

Capsule, 1½—2 in. long, tapering at either end, trigonal with loose, bulging, papery walls.

Seeds, oval rather than spherical and slightly pointed at either end, not compressed.

Observations.

This beautiful species has been in cultivation in England for three centuries, for it was accurately described by Parkinson in 1629 (*Paradisus*, p. 172) as having flowers of a "pale blue russetish colour." His experience of its behaviour in cultivation tallies with its reputation in these days: "This (Iris), as it is very rare, so it seldome beareth flowers with us."

Linnaeus' description of *I. persica* may be traced back to Parkinson though Royen's *Florae Leydensis Prodomus*, p. 18, and Tournefort's *Institutiones Rei Herbariae*, p. 363, and there is therefore no doubt that the plant now known as *I. persica* is the same that Parkinson described. In 1787 a good drawing of this Iris was published as the first plate in the *Botanical Magazine*.

I. persica is not easy to cultivate in England although the reason for this may be that it is so difficult to obtain strong bulbs with which to make a beginning. If this could be done and seedlings raised, it might be possible to get better and more robust specimens. Unfortunately, the plant seems to fail in sandy soils, and from the stiff soils, in which it flourishes, it is almost impossible to lift the bulbs with their store roots intact. If these are broken off the bulb will be greatly weakened, and even if it succeeds in producing a small flower it will almost certainly fail to ripen seeds, and has no chance of forming a sound bulb for the following year. Some help may perhaps be given by pinching out the bud as soon as it appears, and so throwing the energies of the plant into the building up of the new bulb. It is possible, however, that even in their native homes these bulbs grow from seeds to flowering size and then perish, or at any rate leave behind them such small offsets that several years must elapse before they reach flowering size. Evidence for this may perhaps be found in the marked difference in the leaves of flowering and non-flowering plants. Bulbs that are going to flower send up blunt, broad, short leaves, while non-flowering bulbs have longer, narrower and much more pointed leaves.

In recent years a better knowledge of Asia Minor and Persia has shown that there are many Irises growing in various localities which some botanists have taken to be mere colour forms of *I. persica*, while others have given them specific names. Many of them have been introduced into our gardens by the enterprise of Herr Siehe of Mersina. In 1905 the latter published in the *Allgemeine Botanische Zeitschrift* a paper on these Irises, and it is on the details there given, checked by observations of living plants, which I have obtained from Herr Siehe, that the various plants are separated and described.

In the present state of our knowledge we hardly know what value should be attached to the presence or absence of the horny white edge to the leaves as a specific character. When the flowers appear, it is in some cases difficult to distinguish the leaves by this character, which however becomes considerably more marked before the foliage withers away.

The following is an account of the varieties or sub-species to which names have been given.

(1) †Var. *Bolleana*,

SYNONYM.

I. Bolleana, Siehe in *Gard. Chron.* 1901, I. p. 313.

in *ABZ.* 1905, p. 115.

Lynch, *Bk. of Ir.* p. 185 (1904).

DISTRIBUTION. This Iris has been found by Siehe growing on the foothills of the Cilician Taurus at an elevation of 600 to 2200 ft.

Description.

Plants which I have received from Herr Siehe had pale yellow flowers, not veined, but usually with a purple or violet patch on the blade of the falls. The lateral wings on the haft of the falls tend to extend almost horizontally and do not closely clasp the styles. Mature leaves have no conspicuous white edge.

Observations.

This variety was named in honour of the German botanist, Dr Bolle of Berlin.

- (2) † Var. *galatica*.

SYNONYM.

I. galatica, Siehe in ABZ. 1905, p. 115.

DISTRIBUTION. Siehe gives Galatia and Northern Cappadocia and says that he found it in 1904. Bornmüller's earlier specimen seems to be identical.

Near River Halys, 1904, Siehe (K).

Angora, 1892, Bornmüller (V) (B).

Description.

Siehe describes this as a splendid variety, but all the specimens that I have cultivated or seen in cultivation had flowers of a dull grey or purplish-yellow except for the dull red-purple blade of the falls. Siehe adds that forms are found with flowers that are almost light blue or of a uniform yellow. The leaves have a very distinct white margin. The conspicuous features of this variety are:

- (1) The central orange ridge is very broad and the colour spreads on to the surface of the blade.
- (2) There is a very marked constriction between the haft and the blade.
- (3) The wings of the haft extend laterally and do not curl over the style branches.

- (3) Var. *Isaacsoni*, Foster, Bulbous Irises, pp. 34 and 76 (1892).

DISTRIBUTION. Foster received bulbs from Mr Isaacson of Bushire with a note that they were found at Tung i Turkan, Kotal Kamarij and Seenah Safid but not to the north of Bushire. It occurs very scantily and locally in dry open spots on gypsum debris.

Description.

Foster describes this variety as differing chiefly from the type in the horny ribs on the under side of the leaves, in the undeveloped character of the central ridge on the falls, and in the absence of any deep patch of colour on the blade of the falls. The colour was a creamy white tinged with green and broken by thick violet veins, which, running parallel to the median streak on the haft, form a conspicuous violet zone around the ridge on the blade.

- (4) † Var. *issica*.

SYNONYM.

I. issica, Siehe in ABZ. 1905, p. 115.

DISTRIBUTION. This is said by Siehe to be found only on the hills in Eastern Cilicia between Issus and Misis. Even there it is rare.

Description.

Flowers wholly of a bright straw yellow without any markings, except for a few dark dots on the orange crest. The edge of the leaves is ciliate but not conspicuously white.

- (5) † Var. *purpurea*.

SYNONYMS.

I. purpurea, Siehe in ABZ. 1905, p. 115.

? *I. Elenorae*, Holmboe in Bergens Mus. Aarbog. XIII, p. 4 (1907).

DISTRIBUTION. I am told by Siehe that the habitat is in Armenia, a fact which has come to light since his article of 1905.

Armenia; Erzinghan; Sipikordagh, 1889, Sintenis (V) (B) (K).

? Amasia, 1889, Bornmüller (BM). [This is undoubtedly a purple flowered form but it is uncertain whether it is identical with the Erzinghan plant.]

Description.

This variety has rather small flowers of a pleasing shade of red purple. On the haft the edges are grey and the central ridge orange, dotted with brown. On the blade the colour becomes deeper, almost purple black and velvety.

Observations.

This Iris has been crossed with *I. sindjarensis* both as the pollen- and as the seed-parent. Both crosses were obtained by Mr C. G. Van Tubergen, junr., of Haarlem, and both are floriferous and easier to keep than *I. persica* var. *purpurea*.

Pursind† is perhaps not so pleasing as the other cross, for the flowers are composed of grey and red purple.

Sindpur†, however, is of a clear purple colour, and of this there exist several colour varieties. One of the best has been named not inappropriately Amethyst†.

(6) †Var. *Sieheana*.*I. Sieheana*, Lynch in Gard. Chron. 1904, I. p. 282.

Lynch, Bk. of Ir. p. 184 (1904).

•Bot. Mag. t. 8059 (1906).

SYNONYMS.

I. Haussknechtii, Siehe in Gard. Chron. 1901, I. p. 313 non Bornmüller.*I. persica magna*, Hort.? *I. persica* var. *mardinensis*, Hort. Lynch, Bk. of Iris, p. 182 (1904).

DISTRIBUTION. This is said by Siehe to grow in forests of *Pinus Bruttia* on the lower slopes of the Cilician Taurus but to be only common locally. Siehe also says that it occurs in Southern Cappadocia with slight variations.

Cilicia; Hagiraki, 1896, Siehe (E) (BM) (B) (O).

Description.

This variety is very similar to the var. *purpurea*, but the flower is slightly larger. It is not of a uniform purple, but marked with reddish brown-purple on a silvery grey or greenish yellow ground. The leaves have a distinct, ciliate, white horny margin.

(7) †Var. *stenophylla*.

SYNONYMS.

I. stenophylla, Haussknecht und Siehe ex Baker in Gard. Chron. 1900, I. p. 170.

•Bot. Mag. t. 7734 (1900).

I. Heldreichi, Hort. ex Hook. f. in Bot. Mag. t. 7734 (1900).

Siehe in ABZ. 1905, p. 114.

? *I. persica* var. *azurea*, Lynch in Bk. of Iris, p. 182 (1904).

DISTRIBUTION. This plant is also stated by Siehe to be very local in its distribution on the Cilician Taurus at a height of 1200 to 4000 ft., where it flowers from January to March.

Cilicia; Gysel Dere, 1896, Siehe, no. 2 (B) (K) (E).

Description.

This beautiful Iris has flowers consisting of two shades of blue. The groundwork is a pale grey blue, overlaid on the blade by a blotch or blotches of a dark velvety blue black. In some cases the blotches are small and scattered, while in others the whole blade is of a uniform dark colour.

Other characteristic features of the plant are the very large style crests and the large wings on the haft of the falls, which encircle the style branches and hold them close down on to the falls.

The central ridge is of a dull brownish white colour flecked at intervals with dark purple brown.

Strong bulbs are certainly capable of producing more than one flower, in spite of Siehe's statement to the contrary.

The leaves are minutely ciliate but have no conspicuous white edge.

Observation.

The joint authors of the name, *I. stenophylla*, wished to change it to *I. Heldreichi*, but in the meantime it had been already published by Baker in the Gardeners' Chronicle.

(8) †Var. *Tauri*.

SYNONYM.

I. Tauri, Siehe; •Mallet in Gard. Chron. XXIX. p. 191, fig. 74 and p. 313 (1901).

•Bot. Mag. t. 7793 (1901).

Siehe in ABZ. 1905, p. 114.

DISTRIBUTION. This Iris is said by Siehe to be very local in its distribution and to be found on both slopes of the Cilician Taurus growing in forests of *Juniperus excelsa* at a height of from 4500 to 6500 ft., where it was discovered by him in 1898. In England it usually flowers in February or early March but in Asia Minor its flowering period extends from March to May.

Description.

The flowers are of a dark violet purple, veined with white along the haft and around the end of the central ridge on the blade of the falls. This ridge is of a deep orange, dotted along the haft with minute purple spots and distinctly pubescent. The small standards are either horizontal or depressed and usually trilobed. The style crests are large and subquadrate, often broader at the extremity than at the base. The tube is of a deep violet colour. The edges of the leaves are very slightly ciliate and not conspicuously white and horny.

Observations.

This variety appears to be one of the easiest to grow and does well in a fairly rich well-drained soil in a sheltered corner. If the bulbs are well ripened in summer, it is difficult to prevent the bulbs from flowering, and I have even known one to bloom in January, which had been lifted in September and left inadvertently lying exposed on the surface of the ground.

† *I. ALATA*

(PLATE XL)

- Poir, Voy. Barb. II, p. 86 (1789).
 *Bot. Reg. XXII, t. 1876 (1856).
 *Gartenflora, t. 1351 (1891).
 *Foster, Bulbous Irises, pp. 46 etc., 82, figs. 28, 57 (1892).
 Revue Hort. 1902, p. 393.

SYNONYMS.

- I. scorpioides*, *Desfont. Fl. Atl. I, p. 40, t. 6 (1798).
 *Red. Lil. t. 211 (1808).
I. transtagana, Brot. Fl. lusit. I, p. 52 (1804).
I. microptera, Vahl, Enum. II, p. 142 (1806).
I. trialata, *Brot. Phyt. II, p. 44, t. 95 (1816).
I. planifolia, Fiori e Paoletti, Fl. ital. I, p. 227 (1896).
 Asch. und Gr. Syn. III, p. 511 (1906).
Xiphium planifolium, Mill. Gard. Dict. Ed. 8, no. 3 (1768).
 Baker, J. L. S. XVI, p. 123 (1877).
 *Bot. Mag. t. 6352 (1878).
 **Juno scorpioides*, Tratt. Ausw. I, no. 83 (1821).
Thelysia grandiflora, Salis. Trans. Hort. Soc. v. 303 (1824).
Thelysia alata, Parl. Fl. It. III, 317 (1858).
Costia scorpioides, Willk. in BZ. XVIII, (1860) 131.
Neubeckia scorpioides, Alef. in BZ. XXI, (1863) 297.
Juno planifolia, Aschers. in BZ. XXII, (1864) 112.
Coresantha alata, Klatt in Linnaea, XXXIV, 575 (1866).
Xiphium alatum, Baker in Journ. Bot. (1871) 108.

DISTRIBUTION. Spain, Sardinia, Sicily and the north coast of Africa.

- Spain.* Cadiz, 1838, Webb (K).
 1896, Higgins (E).
 Seville, 1847, Willkomm (K) (B).
 1844, Willkomm (BM).
 184—, Welwitsch (V).
 Badajos and Elvas, 18—, Hb. Link (B).
 Cordova, 1909 (HortD).
 Alhama, 1864, Del Campo (BM).
Sardinia. Cagliari, 1834, Gaudin (K).
 1863, Aschereon und Reinhardt (B).
 1828, Müller (C) (E) (V).
 No locality; flore albo, 1834, Thomas (BM).
Sicily. Palermo, 1840, Todaro (B) (BM) (C) (V).
 1840, Parlatore (B).
 1847, Tineo (K).
 1853, Ball (K).
 1855, H. du Parillon (V).
 1869, Gansauge (B).
 1870, Tacono (BM).
 1890, Ross (V).
 1899, Ross (E).
 Leontini, 18—, Hb. Swainson (C).
 Syracuse, 1871, Schweinfurth (B).
 Aderno, 1830, Philippi (B).
 Etna, 1907, Hort (HortD).
North Africa. *Algeria*; Oran, 1842, D. de Maisonneuve (B).
 1882, Debeaux (B).
 Stauli, 1832, Schimper (K) (B) (V).
 Constantine, 1838, Bové (K).
 1857, Choulette (K) (B).
 1865, Tribout (K).
 1876, Reboud (K).
 18—, Dukerley (B).
 Mostaganem, 1851, Balansa (V).
 Koliah, 1861, Lefebvre (V).
Tripoli. No locality, 1869, Rohlf (B).
 Tripoli, 3½ km. S.W. from, 1882, Krause (B).
 Benghazi, 1882, Ruhmer (B).

Diagnosis.

I. alata Juno; acaulis, *segmenta exteriora* alata, in medio tuberculis cylindricis instructa, *pollen* spinis minutis horridum, *semina* globosa vel pyriformia.

Description.

Rootstock, a large bulb, 1—1½ in. in diameter, with brown tunics and 4—6 tapering fleshy roots, persistent in the resting state.

Leaves, deeply-channelled, with polished upper and glaucous under surface, tapering to a point, 3—4 in. long at the flowering time and then growing to a foot or more.

Stem, very short, entirely hidden by the leaves, bearing 1—3 flowers.

Spathe valves, 4 in. long, pale green, not rigid, loose but not inflated.

Pedicel, very short at first but eventually thrusting the ripe capsule to the surface of the ground.

Ovary, cylindrical, sub-sessile in the spathe, ¾ in. long.

Tube, 4—6 in. long, greenish-white, becoming thicker in the upper part where it is tinged with blue; trigonal with a groove running down each face.

Falls, 3—4 in. long by 1 in. or more broad. Blade oblong, the haft cuneate with conspicuous wings not transparent as in most other Junos; the colour is usually blue of some shade but occasionally pure white. The median ridge is conspicuous, of a bright orange colour, dotted along the haft with blackish green and covered with a faint whitish pubescence which spreads slightly on either side.

Standards, about an inch long, canaliculate, with obovate blade and cuneate haft, poised horizontally.

Styles, large, nearly as long, with the crests, as the falls, the edges irregularly toothed.

Crests, very large, sometimes as long as the style, overlapping, sub-quadrate with coarsely-toothed edges.

Stigma, obscurely bilobed.

Filaments, pale mauve, about as long as, or slightly longer than, the anthers, bearing numerous minute, colourless, hairlike processes.

Anthers, broad, white, mottled and edged with purple.

Pollen, white or cream, spherical, covered with minute spines.

Capsule, oblong, trigonous, 2 in. long, coming to the surface only as it ripens. The thin papery walls are often much inflated.

Seeds, oval or pyriform, dark reddish-brown with a wrinkled surface.

Observations.

This Iris was first reported by Clusius in his volume on Spain (Hisp. Hist. Antwerp, 1576) under the name of *Iris bulbosa latifolia*. He found it growing in profusion in the neighbourhood of Cordova and Antequera. In the former locality, at any rate, on the banks of the Guadalquivir and on the surrounding hills, up to an elevation of 2000 feet, it has been found abundantly in recent years. The deepest and richest shades of blue in the flowers are found at the highest elevations in positions where the plants are in partial shade. It is also abundant in similar positions on the slopes of Mount Etna, where, as in Spain and Algeria, the flowering period lasts for three months or more from December or even November, according to the aspect and elevation.

It is a remarkable fact that of all the Irises at present in cultivation, *I. alata* and its near relative *I. palestina* are the only two cases in which the pollen grains are covered with minute spines. In common with all the members of the Juno group, the pollen grains are spherical and if the pentagonal markings or bosses, which are so conspicuous on the pollen of all the others, are present at all in the case of these two, they are very indistinctly and faintly marked. It is possible that these spines tend to protect the pollen from the intrusion of moisture between the grains, which swell and burst at once when immersed in water.

This Iris cannot often be cultivated from year to year in this country, except perhaps in very dry and sunny localities. It does best in a heavy loam and needs complete drought for a period of several months in summer. Even if this is provided either naturally or artificially, it is seldom that the bulbs are able to make satisfactory leaf-growth as they should do, immediately the flowers have faded, owing to the fact that they usually flower in the depth of winter. Consequently sound bulbs are seldom produced or ripened in this country. Fortunately, bulbs of this species are imported in large quantities from the south of Europe and can be purchased very cheaply. It is, therefore, possible by obtaining a supply of these bulbs in August or September to have this Iris in bloom in the open from October onwards until after Christmas. The exceptional summer of 1911 had such a good effect on bulbs of *I. alata* in my garden that, although they were neither protected in any way nor lifted, many flowered again in 1912.

There is a variety *alba* with pure white flowers, which was known to Clusius and which is still sometimes to be obtained and another known as *marginata*, whose flowers are of a dark blue with a conspicuous white or light edge to the blade.

Among flowers of the ordinary type, there is considerable variation in the shade of blue and in the amount of veining.

Plate XL shows the brown roots which were formed at the end of the previous season's growth, and the white root-fibres which were thrown out when growth began in the autumn.





†*I. PALESTINA*

Boiss. Fl. Orient. v. 122 (1884).

Foster, Bulb. Ir. 39, 79 (1892).

SYNONYMS.

Xiphion palaestinum, Baker in Journ. of Bot. ix. (1871) 108.

Juno palestina, Klatt in BZ. xxx. (1872), 498.

var. *coerulea* Post, Fl. Syr. Pal. 768 (1896).

DISTRIBUTION. Syria, usually not far from the coast.

Skanderoun, on the slopes of Lebanon not far from Saida, 1854, Gaillardot (K) (B) (V).

Saida, 1854, Blanche (K).

Jaffa, 1851, De Lessert (B).

Gaza, 1884, Hart (K).

Plain of Sharon, 1863, Osborn (K).

1872, Hayne (K).

Aebk to El Machin, 1890, Post (K).

Hebron, 1863, Lowne (K).

Diagnosis.

I. palestina Juno; *I. alatae* valde similis sed minor; *segmenta exteriora* tuberculis apice globosis instructa.

Description.

Rootstock, a compact ovoid bulb with persistent fleshy roots and brown or purplish outer coats.

Leaves, 5—8 in number, channelled, 4—6 in. long, tapering to a point, the upper surface glossy and the under glaucescent.

Stem, very short, entirely hidden by the leaves, bearing 1—3 flowers.

Spathe valves, 3 in. long, pale whitish green, loose but not inflated.

Pedice, very short at first but eventually thrusting the ripe capsule to the surface of the ground.

Ovary, cylindrical, practically sessile in the spathe, $\frac{1}{2}$ in. long.

Tube, 2—3 in. long, slender.

Falls, 2—3 in. long, less than an inch broad; the wedge-shaped haft bears conspicuous opaque wings, as in *I. alata*, the blade being oblong, with a blunt emarginate point. Along the haft runs a low yellowish ridge with intermittent black dots, which becomes orange on the blade. The ground colour is either yellow, green or blue, marked with a few veins of a deeper shade.

Standards, $\frac{1}{2}$ — $\frac{3}{4}$ in. long, poised horizontally, the haft so deeply channelled as to be almost tubular; the blade is small, ovate, emarginate and usually more or less coarsely toothed.

Styles, narrow, of the same colour as the falls, the edges irregularly toothed.

Crests, large, overlapping, sub-quadrate, with coarsely serrated edges.

Stigma, entire, conspicuous.

Filaments, slightly longer than the anthers, purplish white without the hairlike processes present on those of *alata*.

Anthers, short, sometimes edged with purple or blue.

Pollen, cream-coloured, spherical, covered with minute spines.

Capsule, oblong, trigonous.

Seeds, small, brown, oval.

Observations.

This Iris may be looked upon as the eastern form of *I. alata*. The difference between the two plants is really very slight except in so far as *I. palestina* is usually decidedly smaller than *I. alata*. The colour is more variable in the former, but Post found in Syria a variety that he called *coerulea* and colour alone forms no real specific difference. Foster in Bulbous Irises, pp. 79 and 83, makes a conspicuous difference in the shape of the standards but the examination of a number of specimens shows that this is variable. In both cases the standard consists of a canaliculate haft and an ovate blade. The edge of the latter is always somewhat irregularly indented and these indentations easily give to so small a surface as the blade of the standard of *I. palestina* the appearance of being trilobed, whereas in *I. alata* the indentations appear insignificant along the edge of the larger surface.

Minute differences may however be found. In *I. alata* the stigma is distinctly bilobed but in *palestina* entire, the edge being in both cases finely crenate. Another point of difference can be discovered by the microscopic examination of the falls. In both cases the central ridge of orange or yellow, spotted with black, is covered with minute hairs or tubercles, scattered among which are a number of larger processes. The tips of these are in *alata* merely slightly thickened, whereas in *palestina* the extremities are almost globular.

Foster's statement (ibid. p. 79) that short black hairs or tubercles arise from each of the black spots along the central ridge is a somewhat misleading account of the actual structure, for the long hairs or tubercles occur at irregular intervals both on and alongside the yellow ridge and are of the

same colour as that of the groundwork from which they happen to spring. The slight pubescence formed by these longer processes is visible to the naked eye in both species but is more distinct on the fall of *I. palestina*. On the other hand the filaments of the anthers of *I. alata* bear numerous long, jointed processes, which are not present in *I. palestina*.

As a garden plant, *I. palestina* is, if anything, more difficult to manage than *I. alata*. It has the same difficulty in ripening its growth, and its whole constitution seems to be less robust. Even in the wild state, the plants never grow so luxuriantly as do some specimens of *I. alata*. Imported bulbs, however, usually flower well in their first season at a slightly later period than *I. alata*.

†*I. TUBERGENIANA*

Foster in Gard. Chron. 1899, I. p. 225.

DISTRIBUTION. Turkestan, where it was discovered by Mr van Tubergen's collector in the mountains near Tashkent. The exact locality has not been disclosed.

Diagnosis.

I. Tubergeniana Juno; *I. caucasicae* valde similis sed *folia* glaucescentia, conspicue striata, *segmenta exteriora* barbata.

Description.

Rootstock, a rather slender bulb of the ordinary Juno type.

Leaves, with distinctly horny ciliated margin, 6 in number, conspicuously striated, acuminate, of a light glaucous green.

Stem, very short, 2—4 in., producing 1—3 sessile flowers.

Spathes, acuminate, light green, with scarious tips, about 2 in. long.

Pedicel, very short.

Ovary, cylindrical.

Tube, 1—2 in. long.

Falls, 2 in. long, with lateral expansions or wings: of a bright and yet transparent yellow except on the blade, where the colour is opaque. There may be olive green markings along the centre of the haft and on the blade. The haft bears a yellow central ridge tipped with olive green, which as it emerges on to the blade breaks up into hair-like filaments. The tip is an undivided crest of yellow.

Standards, very small, depressed, with a median tooth longer than the lateral tips.

Styles, of the same transparent yellow colour.

Crests, rather narrow, triangular.

Stigma, conspicuous, oblong.

Filaments, transparent, yellow.

Anthers, yellow.

Pollen, orange.

Capsule, narrow, oblong, with thin membranous walls.

Seeds, globular, resembling those of *I. caucasica* and *I. Willmottiana*.

Observations.

I. Tubergeniana is obviously allied to *I. caucasica*, but the leaves are more glaucous and more distinctly striated. In colour it is very similar to *I. orchioides*, from which it is easily separated by the lateral expansions on the falls, and by the crest that splits up into hair-like threads.

It is unfortunately not a robust species, and it seems to be dying out of cultivation.

†‡*I. SINDJARENSIS*

Boissier, Flor. Or. v. p. 122 (1884).

*Foster, Bulbous Irises, pp. 39 and 80, fig. 24 (1892).

*Baker in Bot. Mag. 7145 (1890).

Hdk. Irid. p. 47 (1892).

SYNONYMS.

Xiphion Aucheri, Baker in Seeman, Journ. Bot. 1871, p. 110.

in J. L. S. XVI. p. 124 (1877).

I. fumosa, Boiss. and Haussk. ex Baker J. L. S. XVI. p. 124 (1877).

Boiss. Fl. Or. v. p. 122 (1884).

[N.B. There does not seem to be any good reason for separating this from *I. sindjarensis*, of which it was probably only a colour variety. *I. sindjarensis* itself is variable in its growth. In some specimens the flowers and leaves are crowded together, in others the internodes are slightly longer and the inflorescence correspondingly less congested. The type of *I. fumosa* seems to have been a specimen of this kind with smoky, yellowish flowers.]

I. assyriaca Hort. ex Lynch, Bk of Iris, p. 175 (1904).

[N.B. This is apparently merely an albino form of *I. sindjarensis*. I find among Foster's MSS. a letter from Max Leichtlin to the effect that this Iris was brought from Mesopotamia by Bornmüller and that Leichtlin distributed it in 1895 as *I. mesopotamica*. The name *assyriaca* was subsequently given to the plant by Haussknecht.]

DISTRIBUTION. North East Syria and Mesopotamia.

Aleppo, 1841, Kotschy (K) (V) (B).

18—, Aucher-Eloy (K).

1865, Haussknecht (K) (BM).

Aleppo (Djebel Muhassan), 1865, Haussknecht (V) (B).

Hierapolis, 1867, Haussknecht (V) (B).

Wiranschehir (Antoninopolis), 1867, Haussknecht, no. 907 (V) (B).

River Dschachdschach (? Djaghdjagh), 1867, Haussknecht (B).

Diagnosis.

I. sindjarensis Juno; *I. caucasicae* affinis sed *foliorum* congestiorum margo alba obsoleta nec conspicua.

Description.

Rootstock, a large ovate bulb, with about 4—6 fleshy roots, persistent through the resting season.

Leaves, about 12 in number, distichous, spreading, very gradually narrowing to an acute point, pale green, very conspicuously striated on the under side, smooth and glossy on the upper surface, with an inconspicuous horny margin, 8—10 in. long by $1\frac{1}{2}$ —2 in. broad at the base.

Stem, about 6—9 in. long, bearing 3—6 or more flowers, sessile in the axils of the leaves.

Spathes, 3—4 in. long, pale green, lanceolate, very pointed, clasping the tube, and reaching beyond it, somewhat inflated, 1-flowered.

Pedicel, none.

Ovary, trigonal, with a shallow groove, and a slightly raised central rib on each face, $\frac{3}{4}$ in. long.

Tube, 2— $2\frac{1}{2}$ in. long, slender at the base and becoming wider above, flushed with purple in the upper part.

Falls, apt to vary somewhat in shape, but having always large wings or auricles, which curl over the styles. The blade is of a rounded oblong shape. There is a more or less yellowish, conspicuously raised median ridge, and the colour is of a somewhat variable bluish white, usually marked with veins of a greenish or deeper blue tint.

Standards, horizontal or deflexed, the canaliculate haft expanding into an obovate or oblanceolate blade, usually with a lobed edge, bluish, 1 in. long by $\frac{1}{4}$ broad.

Styles, $1\frac{1}{4}$ in. long, blue-lilac, deepening in colour towards the base, and usually of a deeper shade than the rest of the flower.

Crests, deltoid, finely crenate, pale blue, large, overlapping.

Stigma, bilobed.

Filaments, white, equal in length to the anthers.

Anthers, cream coloured.

Pollen, white.

Capsule, sharply trigonal, with thin walls, with the outline of the seeds showing through.

Seeds, oval or spherical, not compressed, with brown wrinkled coats.

Observations.

It is not impossible that, when Baker described his *Xiphion Aucheri*, he was really describing some variety of the Iris that we now know and cultivate as *I. sindjarensis*. The behaviour of Iris flowers as they dry is most erratic. Some specimens keep their colour for months or years, and others lose it at once. Baker had before him only three dried specimens collected by Aucher-Eloy (no. 2137). The same difficulty of determining colour from dried material makes it likely that *I. fumosa* is merely a form of *I. sindjarensis*.

I. sindjarensis is the earliest of the tall Junos to come into flower, as might be expected of a plant that comes from much lower levels and a warmer climate in Mesopotamia than its relatives in Turkestan. It is variable both in the colour and to some extent in the size and shape of the flowers. This latter variation is generally to be found in the length of the blade of the falls, which may be very short and project almost horizontally, or be much longer and reflexed.

Most specimens have a delightful fragrance resembling that of vanilla or almonds, which is most pronounced when the sun is shining on them.

There is at least one beautiful hybrid of *I. sindjarensis* crossed with pollen of *I. persica*. This produced a dwarfer plant than the seed parent, very floriferous and having flowers of a turquoise blue. The exact shade varies, I feel sure, from year to year and in different soils, for I have certainly seen specimens in which the colour was much less bright, and yet Mr Hoog, the raiser, has assured me that all the plants now in commerce have originated from a single bulb. A feature of the plant is the golden central ridge on the blade of the falls that it has inherited from the pollen parent.

I. sindjarensis is not quite as vigorous in England as the Bokhara and Turkestan species. That is to say that the exertion of flowering usually exhausts the plant to such an extent that only weak bulbs too small to flower the next year are formed. These will, however, grow on to flowering size in the following seasons.

I. AITCHISONI

Baker as *Xiphion Aitchisoni* in Journ. Bot. XIII. 1875, p. 108.

Boiss. Fl. Or. v. 123 (1884).

*The Garden, Aug. 6th, 1898.

*Drawings of both the purple and yellow flowered forms made by Mrs Aitchison are preserved in the Kew collection.

DISTRIBUTION. The neighbourhood of Rawal Pindi and Peshawar.

The purple form. Salt Range (Sodi Nuz), 1878, Aitchison (K).

Mt Tilla, 1874, Aitchison (K).

The yellow form. Marquallah Pass between Rawal Pindi and Peshawar, 18—, Vicary (K).

Rawal Pindi, 1878, Mrs Aitchison (K).

1880, Aitchison (K).

Cherat Hills, 1908, Deane (no. 5) (K).

"The purple form¹ was first collected on the Marquallah Pass by Vicary in the first Cabul campaign. It also grows on Mount Tilla and all through the Salt Range in the Punjab. The yellow form is only found apparently in one locality in the Park at Rawal Pindi." This information was given viva voce to Foster by Dr Aitchison, who added that he himself planted bulbs of the yellow form on Mount Tilla.

Diagnosis.

I. Aitchisoni Juno; *segmenta exteriora* alata, *caulis* elongatus, tenuis, *folia* multo tenuiora quam in *I. caucasica*.

Description.

Rootstock, a somewhat slender ovate bulb, with slender persistent roots.

Leaves, 2—3, canaliculate, $\frac{1}{2}$ — $1\frac{1}{2}$ in. broad, 12—18 in. long, with a horny edge and 3 or 4 ribs on the under surface.

Stem, 12—24 in. long, bearing 3 or 4 bractlike leaves and 1 to 4 flowers.

Spathe valves, lanceolate, narrow, pale green, membranous, 2— $2\frac{1}{2}$ in. long, reaching above the tube; 1-flowered.

*Pedice*l, none.

Ovary, cylindrical.

Tube, $\frac{1}{2}$ —1 inch long.

Falls, with conspicuous wings as in the other members of the group; blade more or less triangular, deep purple or yellow, with a conspicuous yellow or orange ridge, not laciniate nor continued along the haft.

Standards, horizontal, with a long narrow canaliculate haft, the blade ending in a sharp awl-shaped cusp.

Styles, keeled, an inch long.

Crests, strap-shaped, $\frac{3}{4}$ in. long.

Stigma, bilobed.

Filaments, short.

Anthers, large.

Pollen,

Capsule,

Seeds,

Observations.

It should be noticed that Foster in *Bulbous Irises*, p. 81, says that the claw of fall does not bear wings, but in April, 1893—the year after that in which the pamphlet was written—he received a dried flower from Dr Aitchison, and in this specimen the wings are distinctly visible.

The Kew drawings show that the flowers of the yellow form are sometimes edged with red- or black-brown.

It is unfortunate that this Iris does not appear to be in cultivation at present.

†*I. WILLMOTTIANA*

*Foster in *Gard. Chron.* XXIX. p. 261 (1901).

**Gard. Chron.* XLVII. p. 364 (1910).

*Lynch, *Book of Iris*, p. 127 (1904).

DISTRIBUTION. It was discovered in 1899 by Mr Van Tubergen's collector at a considerable elevation on the mountains of Eastern Turkestan in the neighbourhood of Tashkent. The exact locality was not given by the collector.

¹ There seems to be some mistake here for the Kew specimen certainly appears to be the yellow-flowered form, and is said to be so in MS. attached.

Diagnosis.

I. Willmottiana Juno; *I. caucasicae* haud dissimilis sed *folia* latiora, planiora, *segmenta exteriora* saturate maculata et venosa.

Description.

Rootstock, a stout globose bulb of the usual Juno type.

Leaves, about eight in number, with a white horny edge, broad, not acutely channelled, somewhat falcate, of a deep green with a glossy surface.

Stem, 6 to 8 in. high, bearing usually 4 to 6 flowers but sometimes as many as 9, sessile in the axils of the leaves.

Spathe valves, narrow, not inflated, green, $1\frac{1}{2}$ —2 in. long.

*Pedice*l, very short.

Ovary, trigonal.

Tube, 2 in. long, triangular in section, becoming broader in the upper part.

Falls. The slightly winged haft contracts gradually into the oblong blade. The colour on the haft is of a pale reddish shade of purple veined with blue-violet on white along the centre. The blade is of some shade of blue with a patch of white marked with blotches and veins of a deeper shade. The colour varies considerably and may be a deep lavender, blue-purple, turquoise blue or even wholly white.

Standards, small, depressed, ending in a pointed tooth, flanked by two rounded projections.

Styles, keeled, narrower than the haft, the wings of which, however, do not curl round the styles as in *I. persica*.

Crests, small, triangular or subquadrate, erect.

Stigma, entire, oblong, conspicuous.

Filaments, whitish, sometimes tinged with mauve.

Anthers, cream.

Pollen, cream.

Capsule, trigonal, oblong, with thin papery walls.

Seeds, spherical, brown, wrinkled.

Observations.

This very distinct Iris is obviously closely allied to *I. caucasica*. It differs from that species in the broader, less acutely channelled leaves, of a darker green, in the less developed lateral expansions on the haft of the falls, in the narrow uninflated spathes. The colour, too, is wholly different and the blotched markings on the white patch on the blade of the fall are quite characteristic.

My experience of its cultivation has been that it makes fewer offsets and grows less vigorously than the other tall Junos. This may be due to the fact that it is very floriferous and that the energies of the plant are therefore exhausted in producing the flowers. But, on the other hand, seedlings also grow very slowly. Possibly it needs a heavy soil, and I incline to think from its appearance in other gardens that its lack of vigour here may be due to the extremely sandy character of the soil.

†*I. CAUCASICA*

Hoffmann, Descr. Plant. Iber. 1806, in Comm. Soc. Phys. Mosc. I. p. 40 (1808).

Bieberstein, Fl. Taur. Cauc. I. p. 33 (1808).

Maximowicz, Act. Hort. Petr. VI. p. 497 (1870).

Bull. Acad. Pétr. XXVI. p. 505 (1880).

Mél. Biol. X. p. 688 (1880).

Boiss. Fl. Or. V. 121 (1884).

*Foster, Bulbous Irises, pp. 35 and 77 (1892).

Baker, Hdk. Irid. p. 45 (1892).

*Sweet, Brit. Fl. Garden, vol. III. t. 255 (1828).

*Regel, Gartenflora, t. 800 (1874).

SYNONYMS.

Thelysia caucasica, Parl. Fl. It. III. p. 317 (1858).

Costia caucasica, Willk. in BZ. XVIII. p. 132 (1860).

Neubeckia caucasica, Alef. in BZ. XXI. p. 297 (1863).

Coresantha caucasica, Klatt in Linnaea XXXIV. p. 575 (1866).

Xiphion causicum, Baker, in Journ. Bot. IX. p. 109 (1871).

in Gard. Chron. 1876, I. p. 692.

in J. L. S. XVI. p. 124 (1877).

Juno caucasica, Klatt in BZ. XXX. p. 498 (1872).

DISTRIBUTION. The Caucasus, Eastern Asia Minor, Syria and Persia; possibly it extends also further East into Turkestan but this is uncertain, and the plants from that region are probably *I. orchioides*, etc. (see p. 203).

- Caucasus.* No locality, 18—, Radde (K) (E).
1835, Nordmann (B).
Tiflis, 18—, Szovitz (K) (V) (B).
18—, K. Koch (B).
1882, Schumann (B).
1908 (HortD).
Helendorf, 1838, Hohenacker (V).
Kakhetia, 1886, Kye (B).
Asia Minor. Kurdistan; no locality, 1840, Strangways (K).
Cappadocia, 1834, Hb. Monbret (V).
Armenia; Gumuschkaue, 1862, Bourgeau (K) (V).
1890, Sintenis (B).
Between Egin and Arabkir, 1889, Sintenis (B).
Egin, 1890, Sintenis, no. 2441 (B).
No locality, 18—, Aucher-Eloy, no. 5345 (BM) (V).
Trebizond, 1843, Wittmann (BM).
Erzeroum, 1853, du Parillon (BM) (K).
Diabekir, 1899—1900, Mansell (BM).
Between Van and Bitlis, 1899—1900, Mansell (BM).
Talmian near the Euphrates, 1836, Chesney (V).
Syria. (?) Saida; Barghoutié, 1853, Blanche (V).
(?) Hebron, 1863—4, Lowne (BM).
Persia. Urumiah, 1857— (K).
No locality, 1822, Olivier (B).
Aderbaijan, 18—, Fischer (K).
Teheran, 1843, Kotschy (BM).
Mt Elbruz (Derbend), 1843, Kotschy (BM).
North Persia, 1848, Lynch (BM).
Karaghan (Media), 1882, Pichler (V).

Diagnosis.

I. caucasica Juno; *segmenta exteriora* alata; *caulis* brevis, *folia* conspicue albo-marginata, *flores* concolores viridi-lutei.

Description.

Rootstock, an ovate bulb, with thin brownish outer skins, and fleshy roots, persistent through the resting period.

Leaves, 4—6 in a tuft, lanceolate, falcate, bright glossy green above and glaucous beneath with a white horny edge closely set with minute setae, 4—6 in. long at flowering time; the leaves of non-flowering bulbs are two or more inches longer.

Stem, very short, bearing 1—4 flowers, two forming the terminal spike, the others being sessile in the axils of the leaves.

Spathes, flowered; *valves*, green, inflated, lanceolate, not reaching to the top of the tube; 2 in. long.

Pedicel, none or extremely short, not developing even after flowering.

Ovary, cylindrical, $\frac{1}{2}$ in. long.

Tube, $1\frac{1}{2}$ —2 in. long, slender at the base and becoming slightly broader above.

Falls, greenish-yellow, becoming more distinctly yellow some time after opening; the haft is broad or wedge-shaped and the blade varies considerably in shape; sometimes the ovate extremity expands into two large almost transparent wings; in other cases these wings are only slightly developed and the whole blade is a rounded oblong; the yellow or orange crest is finely toothed, almost breaking into hairs.

Standards, usually deflexed rather than spreading; the deeply channelled haft opening into a small oblanceolate blade, sometimes so deeply toothed on either side as to become tridentate.

Styles, broad, greenish, sharply keeled.

Crests, large, broadly deltoid.

Stigma, bilobed, with a fringed edge, and a more or less well-marked cusp between the two segments.

Filaments, about equal in length to the anthers, greenish-yellow.

Anthers, creamy, large, reaching to the stigma.

Pollen, whitish, spherical, with pentagonal bosses.

Capsule, cylindrical, with thin papery walls, 1— $1\frac{1}{2}$ in. in length.

Seeds, spherical or globose, not irregularly compressed as in *I. orchioides*.

Observations.

After *I. alata*, which was known to Clusius, *I. caucasica* was the next Juno species to be described. It is not a striking nor a very ornamental plant, but the almost transparent flowers of a delicate yellow harmonise so well with the glossy upper surface of the leaves that the result is very pleasing.

Its foliage is stiffer and more rigid than that of most of the other species and the spathes are much inflated.

The typical plant from the Caucasus is small and bears only one or two flowers, but there are taller and more luxuriant forms further south in Asia Minor. Cf. Foster's var. *Kharput* in *Bulbous Irises*, p. 78.

There is considerable doubt whether the plant that Foster called *caucasica* var. *major* (*turkestanica*) (ibid. pp. 36, 76 and Fig. 52) really came from Turkestan, for no such specimens apparently exist in herbarium collections, and reference to an article in the *Gard. Chron.* 1889, i. p. 582 shows that Foster only "understood (the specimens) were gathered in Turkestan."

The lateral expansions of the haft of the fall are sometimes not much developed. This was the distinguishing mark of Foster's *caucasica* var. *Barnumensis* (see *Gard. Chron.*, l.c.) which he afterwards renamed var. *Kharput* (see *Bulbous Irises*, l.c.).

I. Stocksii

Boissier, *Fl. Or.* v. p. 123 (1884).

Baker, *Hdk. Irid.* p. 46 (1892).

SYNONYM.

Xiphion Stocksii, Baker in *Gard. Chron.* 1876, p. 723.

DISTRIBUTION. Beluchistan and Afghanistan.

Beluchistan. Quetta, 18—, Stocks (K).

1850, Hooker (K).

1889, Duthie, no. 8714 (K).

Narai Kotal, 1890, Lacey (K).

Afghanistan. No locality, 18—, Griffith, no. 5903 (K).

Cabul, 1880, Collett (K).

Kuram valley, 1879, Aitchison (K).

Diagnosis.

I. Stocksii Juno; *I. caucasicae* valde similis sed flores purpurei.

N.B. This diagnosis is unsatisfactory, but as the plant has never been in cultivation, it is impossible to determine exactly its relationship to the other species.

Description.

Rootstock, a slender bulb of the ordinary Juno character.

Leaves, 6 in., acuminate, falcate, $\frac{1}{2}$ in. wide, with distinct white edge.

Stem, short, producing about three flowers.

Spathes, one-flowered, $1\frac{1}{2}$ —2 in. long.

Pedicel,

Ovary,

Tube, 1 — $1\frac{1}{2}$ in. long.

Falls. The oblong blade is shorter than the broadly winged haft. The colour appears to be lilac or light purple, but this is uncertain.

Standards, $\frac{1}{2}$ — $1\frac{1}{2}$ in. long, the narrow haft broadens into an obovate blade to which a long narrow point is attached.

Styles,

Crests,

Stigma,

Filaments,

Anthers,

Pollen,

Capsule, $1\frac{1}{2}$ in., long, narrow, trigonal.

Seeds, pyriform, without any conspicuous strophiole, small, light red-brown, wrinkled (Foster MS. description of seeds collected at Quetta by Duthie).

Observations.

This Iris, which has never apparently been brought into cultivation, must be very nearly allied to *I. caucasica*. Indeed, it is difficult to see how it differs from that species, if we leave the uncertain colour out of the question.

There is no record that Foster succeeded in raising any plants from the seeds that Duthie sent him from Quetta (MS.).

†*I. FOSTERIANA*

Aitchison and Baker in *Trans. Linn. Soc. ser. II. part III.* p. 114 (1887).

•*Bot. Mag.* t. 7215 (1892).

Baker, *Hdk. Irid.* p. 46 (1892).

•Foster, *Bulb. Irises*, pp. 44 and 82, figs. 26, 27, 56.

SYNONYMS.

- I. caucasica* var. *bicolor*, Rgl. in Act. Hort. Petr. ix. p. 620 (1884).
 • *I. Narbuti*, O. Fedtschenko in Bull. Jard. Imp. Bot. Pét. v. p. 158 (1905).

DISTRIBUTION. Transcaspia and N.W. Afghanistan.

- Transcaspia*. Askabad; Suluklu (Saratowka), 1900—01, Sintenis (K) (BM) (E).
 Kisil-Arwat, 1901, Sintenis (V) (B).
Afghanistan. Badghis (Gulran), 1885, Aitchison, no. 128 (K) (B).

Diagnosis.

I. Fosteriana Juno; *bulbus* tunicis fusco-viridibus obtectus; *segmenta exteriora* lutea, *interiora* purpurea.

Description.

Rootstock, a slender bulb with persistent, slender, fleshy roots; the outer coat is membranous, of a dark greenish-black colour.

Leaves, few in number, the longest being 8—10 in. long by $\frac{3}{4}$ in. at the widest point, channelled, gradually tapering to a point, striated¹ and glaucous green on the outside. The inconspicuous white margin bears no setae.

Stem, hidden by the clasping leaves, about 6—8 in. long from the ground level to the base of the spathe; 1—2-flowered. After flowering, the stem becomes 9—12 in. long.

Spathe valves, narrow, very pointed, somewhat inflated, green except at the very tip, striated, 2—3 in. long, reaching above the top of the tube.

Pedicel, none.

Ovary, rounded, trigonal, $\frac{1}{2}$ in. long, with thin walls and slightly convex sides.

Tube, 1—1 $\frac{1}{2}$ in. long, light green, hollow for some little way down.

Falls. The haft, which is poised at an angle of about 45 degrees, is 1 in. long by $\frac{2}{3}$ — $\frac{1}{2}$ in. broad, of a creamy yellow with a greenish tinge. Two conspicuous purplish veins run on either side of the central ridge. The orbicular or oval blade is about three-quarters of an inch in diameter, of a rich yellow, with a creamy white edge. On the blade the central orange ridge becomes conspicuous and denticulate.

Standards, ob lanceolate unguiculate, an inch long, horizontal or deflexed, of a rich red-purple colour.

Styles, an inch long, of greenish yellow colour often with some purple streaks.

Crests, large, $\frac{1}{2}$ in. long, almost quadrate.

Stigma, conspicuous, oblong.

Filaments, cream, equal to the anthers.

Anthers, cream.

Pollen, white.

Capsule, rounded, trigonal, with slightly convex sides; walls papery, 1 $\frac{1}{2}$ —2 $\frac{1}{2}$ in. long, closely resembling that of *I. xiphium*.

Seeds, small, cubical, reddish-brown, slightly wrinkled.

Observations.

This species is distinguished from all others that are in cultivation by the dark olive-green coats of the slender bulb and by the contrast between the large purple standards and the yellow of the falls.

In my experience *I. Fosteriana* is not an easy plant to cultivate. The growth is always slender and somewhat weak, with the result that the effort of flowering seems to reduce the strength of the plant to such an extent that good bulbs are not formed for the following year. Indeed, the small offsets are often so weak that they succumb altogether. It is possible, however, that this Iris would grow better in a heavier soil than that in which I have hitherto grown it, provided that the position was sheltered, warm and well drained, and that the soil was kept absolutely dry for some months in summer by some arrangement of glass overhead.

After carefully comparing with my plants of *I. Fosteriana* a sketch of *I. Narbuti* drawn by Mme Fedtschenko in Sumarkand many years ago and very kindly lent me by the artist, I have failed to find any real difference between the two plants. It is true that the blade of *I. Narbuti* bears some dark markings near the end of the crest but these dark markings occur irregularly in other Juno Irises, e.g. in *I. orchoides* and *I. bucharica*, and I see no reason why they should not also occur in some specimens of *I. Fosteriana*, especially as the style branches bear in some cases a number of olive brown streaks.

I. Fosteriana seems also to be peculiar in one other feature, namely in the structure of the leaves. These are much more distinctly striated or ribbed on the under surface than are those of any other Juno Iris that I have been able to examine, and moreover they bear along the ridges or ribs a number of spiny processes such as I have not found on any other species.

¹ See Observations.

†† *I. ORCHIOIDES*

*Carrière in Revue Hort. 1880, p. 337, fig. 68.

Foster in Gard. Chron. 1889, I. p. 588.

*Baker in Bot. Mag. t. 711 (1890).

SYNONYMS.

I. caucasica, Rgl. Descr. Pl. Nov. IX. p. 37 (1884).

I. caucasica var. *oculata*, Rgl. l.c.

DISTRIBUTION. Eastern Bokhara; probably on Mt Aksai near the river Sarafschan

Darwas; Chyrgowat, 1883, Mussa (Exped. Rgl.) (K).

Kulab, 1883, Regel (B) (K).

Chodscha; Mumyu, 1883, Regel (B).

Baldschuan, 1883, Regel (K) (E) (B), 1883 Regel "var. *oculata*" (K) (BM) (E) (V) (B).

Diagnosis.

I. orchioides Juno; *segmenta exteriora* ungue oblongo nec alato, lamina ovata vel suborbiculare, *folia* margine alba obsoleta.

Description.

Rootstock, a bulb as large as or even larger than a hen's egg with long fleshy roots persistent in the dormant state.

Leaves, 6—12 inches long by 2 wide, pointed, deeply channelled, with glossy upper surface and glaucous under surface; the white margin is narrow and inconspicuous but bears a number of minute setae.

Stem, about a foot high producing three or more solitary flowers in the axils of the leaves.

Spathe valves, $1\frac{1}{2}$ —2 in. long, narrow, pale green, acuminate.

*Pedice*l, very short.

Ovary, rounded, trigonal, almost cylindrical.

Tube, $1\frac{1}{2}$ —2 in. long, trigonal.

Falls. The blade is ovate, emarginate, with a conspicuous crest, the haft a narrow oblong. In the type the colour is deep yellow; two narrow greenish veins run parallel along the haft and form more or less distinct dark greenish blotches on either side of the crest.

Standards, small, horizontal or drooping, lanceolate with a narrowly canaliculate haft, $\frac{1}{2}$ — $\frac{3}{4}$ in. long.

Styles, keeled, rather broader than the haft of the falls.

Crests, nearly triangular, with slightly indented outer edge.

Stigma, large, almost semicircular.

Filaments, slightly longer than the anthers, yellowish.

Anthers, yellowish, cream-coloured.

Pollen, pale yellow, spherical with hexagonal bosses.

Capsule, 2—2 $\frac{1}{2}$ inches long, tapering towards either end, of a pale whitish fawn colour with thin papery walls through which the seeds bulge.

Seeds, numerous, deep buff or light brown, irregularly cubical.

Observations.

When this plant was first discovered by Regel, it was looked upon as a large form of *I. caucasica*. It has proved however to belong to an entirely different section of the Juno Irises, for the falls are strap-shaped and the seeds cubical (see p. 188). It differs further from *I. caucasica* in having longer, more pointed and more sharply folded leaves.

There are now in cultivation several forms of this Iris. They vary in the amount of olive-green veining or blotching that is apparent on the blade of the falls. Still more distinct are the varieties *alba* and *sulphurea*, which however only differ from the type in the colour of the flowers, and this is sufficiently indicated by the names. Both these varieties are at least as vigorous as, if not more vigorous than, the type and set seed as freely¹. Unfortunately the seedlings that I have raised have not yet reached flowering size and I am unable to say whether the varieties will breed true.

For cultivation see p. 187.

†† *I. BUCCHARICA*

(PLATE XLI)

*Foster in Gard. Chron. 1902, I. 385, fig. p. 387.

1903, I. p. 251.

*Bot. Mag. t. 7914 (1903).

Rev. Hort. 1903, p. 430.

*Flora and Sylva, 1905, p. 344.

DISTRIBUTION. Mountain slopes in Eastern Bokhara at an elevation of 5000—6000 ft., near the river Sureh-ab, a tributary of the Amu Darya.

¹ Artificial pollination is necessary to ensure fertilisation.

Diagnosis.

I. bucharica Juno; *I. orchiodi* affinis sed *folia* latiora et breviora nec longe acuminata; *segmenta exteriora*, albo-lutea.

Description.

Rootstock, a bulb, similar to that of *I. orchiodes*, but apt to be more globose.

Leaves, 8—12 in. long by 2—2½ in. broad, bright green, deeply channelled towards the upper end, the upper surface glossy and the under glaucous, with a narrow white horny margin, bearing a number of inconspicuous setae.

Stem, 12—18 inches high, bearing 5—7 flowers set in the axils of the leaves.

Spathe valves, 3 in. long, projecting ¾ in. above the standards, of a paler green than in *orchiodes*, slightly scarious at the tip and edge. The outer valve when unrolled is very wide, as much as 1½ in. across.

*Pedice*l, practically none.

Ovary, nearly ¾ in. rounded, trigonal.

Tube, 1½—2 in.

Falls, over 2 in. long, blade more than 1 in. broad. The pure white strap-shaped haft is separated by a slight constriction from the obovate or even orbicular blade of a bright golden colour, emarginate and bearing a large wavy golden crest, which is continued along the haft as an inconspicuous median ridge, faintly dotted with dark green. In some specimens dark purplish veins flank the crest as in *orchiodes*, but in others these are entirely absent.

Standards, small, pure white, depressed below the horizontal; the short canaliculate haft expands into a broadly lanceolate, distinctly mucronate blade.

Styles, pure white, very large and conspicuous, standing up well above the falls.

Crests, large, and reflexed to an upright position, pure white, quadrate or obscurely deltoid.

Stigma, conspicuous, white, semicircular in outline, but much narrower than the style.

Filaments, colourless.

Anthers, creamy white.

Pollen, spherical, with hexagonal bosses.

Capsule, cylindrical, 2½ in. long, with six sides arranged in three pairs. Walls thin and bulging, showing the outline of the seeds within.

Seeds, numerous, deep buff or light reddish brown, irregularly cubical. See Plate XLVIII, Fig. 6.

Observations.

This is the strongest grower, and one of the most strikingly beautiful of all the Juno Irises. That it is prolific is proved by the fact that two bulbs planted in the autumn of 1906 gave 4 flower spikes in 1907, 7 in 1908, 13 in 1909, 21 in 1910, and over 40 in 1911. To obtain this result the bulbs were lifted every second year when the foliage turned yellow in July, and planted again in September in fairly rich soil, in a warm, well-drained position.

Each stem bears 5 or 7 flowers, of which several are usually expanded at the same time and the contrast between the pure white of the styles and the golden yellow of the fall-blades, set among the glossy bright green leaves, is extremely pleasing.

I. bucharica is obviously allied to *I. orchiodes*, with which it agrees in possessing unwinged, strap-shape falls and cubical seeds, but from which it is distinguished by the broader, less gradually tapering leaves, which are more conspicuously striated on the under surface. The colour, too, is very different. The exact relationship of the two plants is, however, uncertain.

Seed is produced in abundance and, if sown at once, germinates freely, but the seedlings take several years to arrive at flowering size.

†*I. WARLEYENSIS*

(PLATE XLII)

*Foster in Gard. Chron. XXXI. p. 386, fig. 134 (1902).

*Bot. Mag. t. 7956 (1904).

*Flora and Sylva, 1905. p. 344

SYNONYM.

*I. dengere*nsis, B. Fedtsch. in Bull. Jard. Bot. Pét. v. p. 157 (1905).

DISTRIBUTION. Bokhara, where it was found by Mr C. G. Van Tubergen's collector in 1901, the actual localities being given as Tachtimuchrad, Ach-wa, Dixan, Kosch-bag, Tupra-kli.

Turkestan, 1909, Juferow (SP).

Between Dengere and Sangtoda, 1884, Regel (SP).

Diagnosis.

I. Warleyensis Juno; *I. orchiodi* affinis sed *folia* conspicue albomarginata; *segmenta exteriora* lamina ovata subito in unguem contracta, saturate purpurea.



Description.

Rootstock, a somewhat slender bulb, with persistent fleshy roots.

Leaves, 6—7, about 6 in. long by 1—1½ broad, with distinct horny margin but no setae, deeply channelled, with shiny upper surface, faintly striated beneath.

Stem, about a foot high, bearing 3—5 flowers in the axils of the leaves.

Spathe valves, somewhat inflated, thin, acuminate, pale green, reaching to the top of the tube, 2—2½ in. long.

*Pedice*l, none, either at flowering time or later.

Ovary, cylindrical, thin walls, ribbed.

Tube, 1½—2 inches, slender at the base but becoming broader above, rounded, trigonal.

Falls. The long pale violet strap-shaped haft expands suddenly into an almost orbicular blade. Along the haft run 4 parallel, deeper veins, flanking a low white median ridge, which becomes a crenate whitish crest on the deep violet blade, which is more or less conspicuously edged with white. Around the end of the crest there is a triangular orange signal patch of varying size. In rare cases this orange patch does not occur.

Standards, narrow, of a pale blue purple or violet, with a sharp, projecting point.

Styles, pale violet, with a more deeply coloured keel and irregularly notched edges.

Crests, oblong, over ½ in. long.

Stigma, very large, quadrate, white.

Filaments, shorter than anthers, pale bluish.

Anthers, cream coloured.

Pollen, spherical, with pentagonal or hexagonal bosses, about 2 in the diameter or 8—9 on the whole surface.

Capsule, cylindrical, almost white, with thin walls, through which the seeds bulge.

Seeds, deep buff or pale red-brown, irregularly cubical.

Observations.

This plant was introduced from Bokkara in 1901 by Mr C. G. Van Tubergen, Junr., of Haarlem.

It comes nearest perhaps to *I. coerulea*, from which however it differs considerably in colour, in the abrupt expansion of the narrow haft of the fall into the almost orbicular blade, and in its less sturdy growth. If the suggestion that *I. coerulea* is a hybrid is correct, then it is probably the result of a cross between *I. Warleyensis* and *I. orchioides*. It is noticeable that the conspicuous white horny edge to the leaves, which separates *I. coerulea* from *I. orchioides* and its varieties, is also found in *I. Warleyensis*.

The cultivation is that of the other members of the Juno group, see p. 187.

† *I. COERULEA*

B. Fedtschenko in Bull. Herb. Boiss. ser. 11. iv. p. 917 (1904).

SYNONYMS.

I. caucasica var. *coerulea*, Rgl. Descr. Pl. Nov. 1x. p. 37 (1884).

I. orchioides var. *coerulea*, Hort. ex Baker, Hdk. Irid. p. 46 (1892).

DISTRIBUTION. The Alatau region of the Western Tian-schan Range to the north-west of Tashkent in Turkestan. (Regel's type came from the valley of the river Pskem near Sjemessas.)

Alatau, 1881, Regel (K).

Between Uratipe and Saamin 4—5000 ft. 1880, Regel (SP).

Dschisak, 1882, Regel (K) (BM) (E) (V) (B).

III, 1886, Krassnow (K) (E).

Diagnosis.

I. coerulea Juno; *I. Warleyensi* similis sed major, floribus pallidioribus; segmentorum exteriorum lamina gradatim in unguem contracta.

Description.

Rootstock, a bulb with persistent fleshy roots like those of *I. orchioides*.

Leaves, about eight in number, with a more conspicuous white edge than in *I. orchioides*.

Stem, about 15 in. high, bearing 3—5 flowers in the axils of the leaves.

Spathes, 2½—3 in. long, green, with a slightly scarious tip, the outer valve is obscurely keeled.

*Pedice*l, none.

Ovary, ¾ in., rounded, trigonal, slender.

Tube, 2¼ in. long, slender.

Falls. The narrow strap-shaped haft widens out slightly towards the base, and then contracts suddenly at the top of the tube. The haft expands gradually into the obovate oblong blade. The almost white, crinkled and indented crest is conspicuous on the blade, but sinks to a mere ridge along

the haft. The outer edge is of a grey blue, which gives way to green as it fades into the central yellow patch that surrounds the end of the crest.

Standards, $\frac{3}{4}$ —1 in. long, with canaliculate haft, and a narrow, pointed lanceolate blade, drooping until they touch the tube.

Styles, about $1\frac{1}{4}$ in. long, keeled, with a dark blue stripe running along the centre; the rest of the surface is a pale bluish white.

Crests, subquadrate, $\frac{3}{4}$ in. long, slightly veined with blue.

Stigma, a prominent oblong, the upper edge obscurely bilobed.

Filaments, colourless, short.

Anthers, creamy, longer than the filaments.

Pollen, cream.

Capsule, not seen, for the plant has always hitherto proved sterile.

Seeds,

Observations.

There is no real proof that the identification of the plant, that has been in cultivation as a variety of *I. orchioides* for some years, with *I. coerulea* is correct but, as both the description and the herbarium specimens correspond and as Mme Olga Fedtschenko identifies them in her paper on the Turkestan Irises in the Journal Russe de Botanique for 1909¹, I have ventured to do so too.

The plant is obviously distinct from *I. orchioides*, of which it might, however, be a hybrid. The most obvious difference lies in the distinct smooth white horny edge to the leaf. In *I. orchioides* this edge is much less distinct and replaced by a number of fine colourless points or setae, which do not occur on *I. coerulea*. The less obvious difference is that plants growing under the same conditions as *I. orchioides* and its varieties have never yet set any seed, although artificially pollinated and although the others seed every year.

It is possible that there exist other forms of a different colour to that described. In April, 1911, I found one in flower in Foster's garden at Shelford, in which the yellow blotch round the end of the ridge on the blade of the falls was entirely absent, and which bore flowers of a lavender blue. There was no means of knowing the history of this plant, and it is possibly a hybrid raised by Foster that has grown to flowering size since his death. There is no mention of any such form among his notes.

†† *I. ROSENBACHIANA*²

Regel in *Act. Hort. Petr. VIII. p. 675, t. 8 (1884).

*Gartenflora XXXV. pp. 409, 617, t. 1227 (1886).

Foster in Gard. Chron. 1887, I. p. 390.

1889, I. p. 350.

*1890, I. p. 577.

*Bulbous Irises, pp. 41 and 81, figs. 25 and 55 (1892).

Baker in Bot. Mag. t. 7135 (1890).

Hdk. Irid. p. 46 (1892).

var. *baldshuanica*.

SYNONYM.

I. baldshuanica, Fedtsch. in Journ. Russ. Bot. 1909, p. 77.

[This is a smaller plant than the type and flowers a fortnight or a month later. The flowers are sometimes of a pale primrose yellow more or less veined and blotched with brown-purple. Other colour varieties are also known. The exact relation of this plant to the type is not yet determined. See Observations.]

DISTRIBUTION. Turkestan.

Darwas; Tavildara (? Tschildara), 1883, Nikiforow (K) (BM) (V1 (B).

Sagredascht, 1883, Regel (B).

Baldschuan, Kalaschoduha, 1883, Regel (E).

Diagnosis.

I. Rosenbachiana Juno; acaulis; *segmenta exteriora* oblonga, lamina parva ungue nonnunquam angustiore; *semina* strophiola albida conspicua.

Description.

Rootstock, a bulb, with short fleshy roots.

Leaves, deep green, with a glossy upper surface, ribbed and somewhat glaucous beneath, deeply channelled and somewhat bluntly pointed, 3—6 to a tuft, 1—2 in. long at flowering time, eventually 9 in. long by 2 broad.

Stem, very short, bearing 1—3 flowers, in the axils of the leaves.

¹ The value of this identification is somewhat discounted by the fact that Mme Fedtschenko includes among the synonymy "and probably *I. Willmottiana*," which belongs to quite a distinct group.

² Named after the prefect of Turkestan at the time of its discovery.



XII

Iris Hartwegii

Spathe valves, closely clasping tube, not scarious, nearly colourless, veined with green.

Pedicel, very short.

Ovary, cylindrical.

Tube, 3—6 in. long, usually of a dark purple colour.

Falls, a lengthened oblong, practically strap-shaped, the haft being in some cases broader than the blade, though usually of the same width. The yellow or orange crest is very conspicuous on the blade, gradually becoming lower on the haft. 2—2½ in. long, ½ in. broad.

Standards, about an inch long, with short canaliculate haft and broad blade, reproducing the predominant colour of the falls, either horizontal or drooping.

Styles, broad, about an inch long.

Crests, large, in some cases as long as the styles.

Stigma, prominent, entire, oblong.

Filaments, about as long as the anthers or less.

Anthers, yellow.

Pollen, white or yellow, spherical, with 3—5 hexagonal bosses in the diameter; usually a few grains occur with a diameter twice as great as that of the rest.

Capsule, a long oval, walls membranous, 2 in. long.

Seeds, numerous (as many as 89 perfect seeds having been found in one capsule), of a bright chestnut brown, with a conspicuous white aril, running down one side of the seed. Plate XLVIII, Fig. 14.

Observations.

This Iris is certainly one of the most gaudy, if not the most beautiful, of the early flowering species, and we can only regret that it is imperfectly known. Further knowledge may make it advisable to found several closely allied species, but meanwhile it seems best to describe it in general terms, and note the fact that it is very variable both in colour and in the details of its shape.

It is characteristic of all the forms that the haft of the fall is without lateral wings or flanges. Moreover, the upper surface of the haft is convex rather than concave. The flowers usually appear when the leaves are but slightly developed, but there is a form in cultivation, of which more must be said later, in which the leaves are much more developed before the flowers appear.

The species seeds readily and abundantly, and the grains are of a characteristic shape, quite distinct from that of the other Junos except *I. drepanophylla*, and indeed from that of any other known Iris. They are more or less spherical or globose, with a very conspicuous white aril. The pollen, however, is of the characteristic Juno type, spherical, with numerous netted bosses. It may be either yellow or white.

In the specimens first introduced purple, yellow, and white are the dominant colours in the flowers. The haft is usually of a pale purple colour, with four parallel deeper veins. On the blade the purple colouration becomes intense and velvety, set off by the orange crest, and then fades away to a lighter shade or even to white at the extreme tip.

More recently two other varieties have been introduced. One agrees roughly in colouring with the original, but the parallel lines on the blade are much less noticeable, and usually broken up into dots and dashes. The standards are broadly ovate rather than lanceolate, the crests much smaller and the leaves are much more developed before the flowers appear.

This latter character is also found in a still more variable type, which was obtained by a collector, working for Miss Willmott and Mr C. G. Van Tubergen, of Haarlem, from a locality in Turkestan, which rejoices in the name of Tabidara Bolo, but which I have so far failed to find on any map¹. The flowers of this batch of plants are smaller, and usually do not appear until April; the style crests are comparatively small. The colour of the falls is either primrose with brown veins, faint purple on pale primrose, or deep red-purple with an orange crest. The standards and styles reproduce the predominant colour of the falls, in varying shades. It is probably to the yellow flowered form of this variety that the name *I. baldschuanica* was given by Mme Fedtschenko, cf. Journal Russe de Botanique, 1909, p. 77.

It is obviously worth while to raise seedlings of so variable a species, and Foster found that bulbs raised from seeds of the original plants gave flowers of endless variety. I am not aware that seedlings of the later groups have yet flowered, and my own experience is that the bulbs develop slowly. It is a curious fact that the bulbs of this species are also very slow to increase, and it is to this that the relatively high price of the bulbs is due.

It is also noteworthy that the species has so far refused to hybridise with others. Flowers fertilised with foreign pollen refuse to set any seed, and my own experience agrees with that of Foster and of Van Tubergen. For cultivation see p. 187.

I. LINIFOLIA

O. Fedtschenko in Bull. Jard. Imp. Bot. Pét. v. p. 159 (1905).

SYNONYM.

I. caucasica var. *linifolia*, Regel in Act. Hort. Pet. VIII. p. 678 (1883).

¹ This name is possibly synonymous with Tavildara in Darwas in Turkestan.

DISTRIBUTION. Turkestan; in Eastern Bokhara and Fergana.

Between Angren and Kokan, 1880, Regel (SP).

Hissar Range near Karatag, 1905, Haberhauer (Hort. Willmott).

Diagnosis.

I. linifolia Juno; *foliis* angustis, *segmentis* exterioribus barbatis, *seminibus* arillo albido ornatis, *stigmatibus* bifurco facile distinguitur.

Description.

Rootstock, a slender bulb of the ordinary Juno character.

Leaves, 3—5 to each bulb, narrow, acuminate, about 6—8 in. long at flowering time by $\frac{1}{2}$ — $\frac{3}{4}$ in. wide. The upper surface is of a dark glossy green with faint white veins, the under of a glaucous grey green with fine raised ribs. The edge is white and horny with no trace of any setae.

Stem, only a few inches long, slender, bearing 1—3 flowers.

Spathes, green, somewhat ventricose, keeled, membranous at the tip.

Pedicel, none.

Ovary, cylindrical.

Tube, $\frac{3}{4}$ —1 $\frac{1}{4}$ in. long, slender.

Falls. The comparatively broad haft passes with a very slight constriction into the obovate blade. The colour is a grey white more or less tinged with green except for a yellow patch of variable size round the end of the crest. The haft bears 4 parallel green veins with a few faintly-marked branching lateral veins of the same colour. Along the haft the central ridge is rounded and green but becomes yellow on the blade and breaks up into a number of coarse hairlike tubercles.

Standards, minute, horizontal or pendent, usually three-lobed with the central point the longest, greenish white.

Styles, of a pale greenish white, keeled.

Crests, large, triangular, or subquadrate.

Stigma, bilobed.

Filaments, longer than the anthers.

Anthers, short, cream or cream edged with blue.

Pollen, white, with the usual pentagonal or hexagonal bosses characteristic of the pollen of the Juno section.

Capsule, narrow, oblong, with papery walls.

Seeds, quite unlike those of any other known Juno species, resembling those of the *Oncocyclus* Irises but smaller with a conspicuous white aril; globular or pyriform.

Observations.

This Iris was first described by Regel as a form of *I. caucasica*, from which however it differs widely in its linear leaves and peculiar seeds. It has remained unknown except from herbarium specimens until it was rediscovered in 1905 by Haberhauer who collected it for Mr C. G. Van Tubergen of Haarlem and Miss Willmott on the Hissar range near Karatag in Northern Bokhara. In 1909 I saw a number of plants of this Iris growing and flowering in Miss Willmott's garden at Great Warley and it is on these and on some of Regel's typical specimens (SP) that the description here given is based. It is not a vigorous plant and may be difficult to keep in cultivation.

The plant is remarkable for its deeply bilobed stigma and for the unusual character of the seeds. It might almost be said to form a fourth subdivision within the Juno section.

I. DREPANOPHYLLA

Aitchison and Baker in Trans. Hort. Soc. ser. II. part iii. p. 115 (1887).

Baker, Hdk. Irid. p. 46 (1892).

SYNONYM.

I. fumosa var *stenoloba*, Bornmuller and Sintenis MS. on herbarium specimens.

DISTRIBUTION. Transcaspia to Afghanistan.

Askabad (Nephton), 1900, Sintenis (K) (BM) (E) (B).

Afghanistan; Badghis (Gulran), 1885, Aitchison (K).

Diagnosis.

I. drepanophylla Juno; *caulis* productus; alia ut in *I. Rosenbachiana*.

Description.

Rootstock, of the usual Juno type.

Leaves, 4—8 in number, falcate, channelled, with a horny minutely ciliate edge.

Stem, 9—15 in., bearing 3—6 flowers in the axils of the leaves.

Spathes, 2 in. long, membranous at the edge and tip.

Pedice, very short.

Ovary, 1 in.

Tube, $1\frac{1}{2}$ in.

Falls. The narrow strap-shaped haft passes without any constriction into the small ovate blade which bears a raised central ridge. The colour is a bright yellow.

Standards, minute, spreading horizontally.

Seeds, oval or pyriform, brown, wrinkled, with conspicuous white aril or strophiole, resembling that of *I. Rosenbachiana* but not so large.

Observations.

This Iris has never apparently been introduced into cultivation and yet it would be an interesting plant for, with the exception of *I. Rosenbachiana* and *I. linifolia*, it is the only Juno Iris having seeds with a conspicuous white aril.

It is curious that its distribution is the same as that of *I. Fosteriana*. It is distinguished from this by its seeds, by the small fall-blade and by the lack of the purple standards which are so remarkable in *I. Fosteriana*.

Other Juno Irises.

The following species of Juno Irises from Turkestan have been described by Mme Olga Fedtschenko and by her son Boris Fedtschenko of the St Petersburg Botanic Garden. Owing however to the fact that I have been unable to obtain either seeds, bulbs, or satisfactory herbarium specimens, I hesitate to place them in the divisions into which the Juno group has been divided and merely give their original descriptions together with suggestions as to their affinities.

I. hissarica, O. Fedtschenko, ex Kneucker in Flora (A. B. Z.), 1905 p. 157.

DISTRIBUTION. On dry grassy hills near Sari-Kannisch in the Khanate Chussar in Bokhara at a height of from 1800 to 3600 feet.

Sari-Kannisch, —, Kronenburg (SP).

Description.

Rootstock, a long-necked bulb of the Juno type.

Leaves, narrow, rising above the flowers, somewhat wavy, falcate.

Stem, hardly produced at all.

Spathes, green, scarious at the tip.

Tube, gradually growing wider in the upper part, slightly overtopping the spathe.

Falls, yellowish with a deep violet blade, edged with white. The small ovate blade is less than half as long as the haft. The central crest is white.

Standards, elongated, two-thirds as long as the falls, obtuse, gradually narrowing to the haft; the colour is violet.

The plant was described only from a dried specimen and this probably accounts for the statement that the falls are yellow and violet. (A pale lilac would usually appear yellow in a dried specimen.) Mme Fedtschenko places *I. hissarica* near *I. Narbuti* and *I. dengerensis*, from which she distinguishes it by the narrower leaves and the colour of the flowers. The standards are shorter than those of *I. Narbuti*.

[N.B. There is obviously some uncertainty about this plant, for in the paper in the Journ. Bot. Russ. (1909) the flowers are described simply as yellow. After examining the specimen quoted I am inclined to look upon this plant as merely an example of *I. Rosenbachiana* but owing to the imperfect material it is impossible to feel much confidence in any such identification.]

I. Kuschakewiczi, B. Fedtschenko in Bull. Jard. Imp. Bot. Pet. v. p. 158 (1905).

DISTRIBUTION. Turkestan.

Kurdai, 1879, Fetissow (SP).

Description.

Stem, hardly produced, densely clothed with leaves, which are falcate and possess a distinct horny margin with prominent setae.

Tube, slightly overtopping the spathes.

Flowers, bluish.

Falls, elongated, oblong, with a deeply-coloured circular patch on the blade.

Standards, short, drooping, broadening a little from the base and then dividing into three acute points.

Affinity with *I. narynensis* is suggested in the original description, and it is not easy to separate the two plants except that the leaves of *I. Kuschakewiczi* seem broader, stiffer, and more sharply falcate and the segments of the flowers broader.

I. narynensis, O. Fedtschenko in Bull. Jard. Imp. Bot. Pet. V. p. 159 (1905).

DISTRIBUTION. This was found in Turkestan by A. Regel in 1880.
Valley of the Naryn, 1881, Regel (SP).

Description.

Rootstock, a long-necked bulb of the usual Juno type.

Leaves, glaucescent, narrow, but little waved or falcate, with a white edge and prominent setae.

Stem, 1—2½ in. only, slender, bearing 1—2 flowers.

Spathes, greenish, little inflated.

Tube, slightly overtopping the spathes.

Flowers, lilac.

Falls. The blade is of a deep violet with a broad white margin and a white crest, which in its upper part is denticulate and in the lower splits up into hairlike threads. The haft is oblong, not winged.

Standards, a little more than half as long as the falls, with a lanceolate pointed blade.

Filaments, about equal in length to the yellow anthers.

Observations.

I. narynensis is not unlike *I. linifolia* in appearance but is easily distinguishable from it by the setae, which edge the white margins of the leaves, by the undivided stigma and by the deep purple colour of the central portion of the blade of the falls. Colour alone would, of course, be no real difference but the setose edges of the leaves and the formation of the stigma show that *I. narynensis* is quite distinct. Until the seeds are known, it is impossible to assign it with certainty to any sub-division within the Juno Section.

THE XIPHIMUM SECTION

The group of bulbous Irises of which the best known representative is *I. xiphium*, the Spanish Iris, comprises six species all natives of the Iberian Peninsula or of North-West Africa¹. The most northern representative, *I. xiphoides*, is confined to the Pyrenees and the hills of North-Western Spain and is sharply distinguished from the rest of the group both by the form of the segments of the flower and by its requirements in cultivation. In its native home it grows in damp alpine pastures, where moisture is continually oozing through the soil and it is therefore most luxuriant in those gardens that possess a moist soil, rich in humus. It differs, too, from all the other members of the group by the fact that the tips of the leaves do not pierce the surface of the soil until after the New Year, while all the other species appear above the ground in autumn.

The other members of this group all delight in a soil that becomes dry and warm in summer, so that their bulbs are adequately ripened. Indeed, they do not continue to flourish unless this ripening of the bulbs takes place. Unless therefore the soil and the climate naturally provide such a resting period, it becomes essential to lift the bulbs when the leaves turn yellow about the end of July or early in August and store them in sand or other dry material for about a month. Bulbs that have been lifted should not be left exposed to the sun and air longer than is necessary to dry the earth that remains clinging to them, or they will begin to wither and lose their plumpness. This frequent, or even annual, lifting of the bulbs has an additional advantage, for it tends to increase the stock of bulbs by allowing all the bulblets a chance to develop. The bulb illustrated on Plate XLIII shows the way in which four or six bulblets are packed closely one above the other in equal numbers on either side of the main bulb. In the wild state, or when the bulbs remain undisturbed in the same position year after year, these lateral bulblets have to struggle for existence against the more vigorous central bulb and therefore often succumb from want of nourishment.

In making up a bed for these Irises, sharp drainage is the one essential but the opposite extreme of giving the bulbs pure sand and no nourishment must also be avoided. Heavy soil should therefore be lightened and rendered porous and barren sand enriched by the liberal addition of humus in the form of well-decayed leaf soil or old manure. The addition of some lime or chalk is beneficial.

The stock of these bulbs increases rapidly when the offsets are removed and planted out a few inches apart. They grow to flowering size in one or two years and form, of course, the only means of propagating any particular form or variety. Notes on the method of raising seedlings will be found in the chapter on raising Irises from seed, page 235.

Speculation of some interest is involved in the question whether bulbous or rhizomatous Irises first made their appearance in the development of the genus. Whatever the truth may be, there is in some ways a striking resemblance between the flowers of *I. xiphium* and those of *I. spuria*. The form and poise of the segments is almost identical and I have even had instances of strong growing examples of *I. xiphium*, which produced an upright lateral branch, precisely like those of *I. spuria*. Moreover there occurs on the short funnel-shaped tube of each a curious nectarial exudation, which

¹ *I. xiphium* is also found in France in the neighbourhood of Béziers and *I. juncea* in Sicily and apparently also near Genoa.

may be seen on Plates XVII and XLIII. This phenomenon is not confined however to these two species, for it is also found in some American species and invariably attracts the attention of ants, often to the detriment of the flowers¹.

The species may be separated as follows:—

- | | | |
|----|--|------------------------------------|
| | { Outer segments (falls) with a short broad triangular haft and a nearly orbicular blade. | <i>I. xiphioides</i> (see p. 211). |
| | { Outer segments (falls) panduriform, having a long oval haft separated by a slight constriction from the ovate or nearly orbicular blade. | 1. |
| 1. | { Perianth tube very short, broad. | <i>I. xiphium</i> (see p. 213). |
| | { Perianth tube $\frac{1}{2}$ inch or more in length. | 2. |
| 2. | { The outer tunics of the bulbs thick and leathery. | <i>I. juncea</i> (see p. 215). |
| | { The outer tunics of the bulbs thin and membranous. | 3. |
| 3. | { Outer segments (falls) bearded. | <i>I. Boissieri</i> (see p. 217). |
| | { Outer segments (falls) not bearded. | 4. |
| 4. | { The inner segments (standards) obtuse, rounded. | <i>I. filifolia</i> (see p. 218). |
| | { The inner segments (standards) lanceolate, pointed. | <i>I. tingitana</i> (see p. 219). |

†† *I. XIPHIoidES*

- Ehrhart, Beitr. VII. p. 140 (1792).
 *Bot. Mag. 687 (1803).
 Pers. Syn. Plant. p. 52 (1805).
 Willd. Sp. Pl. I. p. 231 (1797).
 *Eeden, Album, t. 4 (1872-81).
 *Red. Lil. t. 212 (1808).
 *Tratt. Auswahl, no. 88 (1821).
 *Drapiez, Herb. Amat. de Fl. II. p. 142 (1829).
 *Revue Hort. 1891, p. 36.
 1907, p. 446.
 *Journ. Hort. Soc. XXVIII. f. 140 (1903-4).
 Nyman, Consp. p. 700 (1878).
 Richter, Pl. Eur. I. 258 (1890).
 Baker, Hbk. Irid. p. 40 (1892).
 Lynch, Book of Iris, p. 157 (1904).
 Asch. und Graeb. Syn. Mit. Fl. III. p. 514 (1906).

SYNONYMS.

- I. xiphium*, Linn. Spec. Pl. ed. I. p. 40 (1753), ex parte (see Observations, p. 214).
 Hort. Kew. I. 73 (1789), ex parte.
 Jacquem. Coll. II. p. 320 (1788).
I. pyrenaica, Bubani, Sched. Crit. 3.
 Willk. et Lange, Prod. Fl. Hisp. I. p. 142 (1861).
 Baker in Journ. Bot. IX. (1871), p. 13.
I. cepifolia, Stokes, Bot. Comment. I. p. 233 (1830).
I. pyrenaica, Bubani, Fl. Pyr. IV. p. 142 (1901).
I. anglica, Hort. ex Steud. Nom. ed. I. p. 437 (1821).
I. argentea, Hort. ex Revue Hort. LXIII. (1891), p. 36.
I. bulbosa, Pallas MS. in Hb BM.
Xiphium latifolium, Mill Gard. Dict. ed. VI. no. 3 (1771).
 Baker in J. L. S. XVI (1877), p. 122.
Xiphium jacquini, Schote, Flora VII (1824), 2. Beibl. 17.

DISTRIBUTION. The Pyrenees and apparently also the Peñas de Europa in the Asturias (if this is the locality meant by Gandoger's Picos de Europa (C)).

- L'Hospitalet (Ariège), —, Petit (BM).
 Andorra, 1847, Bourgeau (K) (C) (B).
 Gèdre, 1878, Bordère (B).
 Barèges, 1892, Engler (B).
 Tourmalet, 1859, J. S. Mill (K).
 Pic du Midi, 1850, Moride (C), 1886, Magnier (V).
 Gavarnie, 1865 (BM).
 1880, Ball (E) (K).
 1860, Bordère (V), 1878 (B).
 1853, de Parseval-Grandmaison (V).

¹ Cf. Clusius, Hisp. p. 286, who, when writing of the varieties of *I. xiphium*, adds "Omnium istarum floribus, illius vero praesertim quae est vario flore (quod, ut opinor, rorem quandam in lateribus exsudent), formicae mirum in modum infestae sunt."

Benasque (Aragon), 1862, du Parquet (BM).
 Port de Venasque, 1858, Boissier et Reuter (E), 1910, Hort (HortD).
 Bagnères de Luchon, —, André (B).
 Cauterets (Hautes Pyr.), 1889, Neyraut (B).
 Hecho, 1858, Bubani (B).

Diagnosis.

I. xiphioides Xiphion¹; *bulbus* ovatus, tunicis membranaceis in fibras abeuntibus; *perigonii tubus* paene obsoletus; *segmenta interiora* suborbicularia; *germen* latius quam in *I. xiphio*, seminibus globosis nec compressis.

Description.

Rootstock, a large ovate bulb with thin membranous, dark brown coats, splitting into fibres at the apex.

Leaves, channelled, the outer surface being a glaucous green and the inner a silvery grey, tapering to a point, equal in length to the stem.

Stem, 12—18 in. long, clothed in short, acuminate, reduced leaves, and producing only a terminal head of 2—3 flowers.

Spathe valves, green, ventricose, 3—4 in. long, sharply keeled.

Pedicel, 1—3 in. long, rounded, trigonal.

Ovary, narrow, triangular, $1\frac{1}{4}$ — $1\frac{1}{2}$ in. long.

Tube, $\frac{1}{4}$ — $\frac{1}{2}$ in., funnel-shaped.

Falls. The broad emarginate blade is separated by a marked constriction from the broadly winged haft. These wings are large and almost transparent and stand up on either side of the styles. In the wild state the flowers are almost always of a deep rich blue, set off with a conspicuous golden patch on the fall.

Standards. The blade is almost orbicular, but tapers at the base to a short wedge-shaped haft. The standards are much shorter than the falls.

Styles, broad, widening in the upper part, very sharply keeled.

Crests, triangular.

Stigma, two-pointed.

Filaments, white, stained and spotted with purple.

Anthers, white, edged blue.

Pollen, cream.

Capsule, as much as 4 in. long by $\frac{1}{2}$ — $\frac{3}{4}$ wide, tapering at either end.

Seeds, dark red-brown, globose, wrinkled.

Observations.

Clusius relates in his History of Spanish Plants (1576) that this Iris had been brought to him from Bristol, whither he went and searched in vain for it. Subsequently he heard from Lobel that he had found it growing in gardens at Bristol and from this fact Clusius was no doubt right in drawing the inference that it had been brought to the port of Bristol by some of the many ships that traded thence to Spain and Portugal. With his usual accurate observation, Clusius distinguishes the plant at once from *I. xiphium* by noting that the ripe seeds rattle in the capsule, if the latter is shaken. (Semen maturum in siliquis, si moveantur, crepitat. Clusius, *Hisp.* p. 278.) It was owing to this early belief that the plant grew wild in the neighbourhood of Bristol that it became known as *I. anglica*.

Gerard (*Herball*, p. 92, 1597) was obviously referring to this Iris when he wrote of the leaf of an *I. bulbosa* that "in the bottome of the hollownesse it tendeth to whitenesse," for this precisely describes the silvery-white lining of the channelled leaves.

The first mention of the name "English Iris" is probably in the Hortus Eystettensis (1613), Ordo IV, Fol. 7. i and 8. i, where white and violet forms of an *Iris bulbosa anglicana* are depicted.

In 1720 no less than twenty garden varieties of this Iris are represented in Simula's Flora exotica, preserved in the Natural History Department of the British Museum.

Among all the varieties that have been raised, ranging in colour from the deep violet blue of the wild plant through pale violet and mauve to white and from white to pink and deep red, each with its yellow central line on the falls, it is significant that no yellow flowered form has ever appeared. This fact, together with the marked difference in the shape of the segments, in the capsule and seeds and in the whole growth of the plant shows that *I. xiphioides* is quite distinct from *I. xiphium*, in spite of the fact that Linnaeus does not separate them but includes them both under his *I. xiphium*. See the Observations on the latter, p. 214.

For the cultivation of the "English" Iris, see the introductory remarks on the Spanish Iris group.

This Iris is very easily raised from seed, though the process is somewhat slow and takes four years at least. The seeds should be sown in drills half an inch or an inch deep on soil to which plenty of old leaf mould or well-decayed manure has been added. This addition tends to preserve in the soil that moisture without which this Iris will not flourish. The young plants will germinate in spring and may be left in the seed-beds until they reach flowering size in the course of time.

¹ The name Xiphion is applied to all those Irises whose rootstock is a bulb without persistent roots in the resting state.

So many seedlings have been raised with such various names that it seems inadvisable to name any as being especially beautiful. Each dealer seems to have different names and their number is constantly increasing. Some forms are flaked and mottled in the most curious way but few, if any, are more beautiful than the deep violet blue wild type. Seedlings, apparently, always at first produce flowers of a uniform colour and only change into flaked and mottled varieties after an indefinite number of years. This phenomenon is similar to that observed in Tulips.

†*I. XIPHIMUM*

(PLATE XLIII)

- Linn. Spec. Pl. ed. I. p. 40 (1753), ex parte (see Observations, p. 214).
 Ehrhardt, Beitr. VII. 139 (1792).
 •Bot. Mag. t. 686 (1803).
 Pers. Syn. Plant. p. 52 (1805).
 •Red. Lil. t. 337 (1812).
 •Drapiez, Herb. Amat. de Fl. I. t. 68 (1828).
 •Journ. Hort. Soc. XXVIII. fig. 144 (1903-4).
 Baker, Hdk. Irid. p. 39 (1892).
 •Lynch, Book of the Iris, p. 154 (1904).
 Nyman, Consp. p. 699 (1878-82), Suppl. p. 294 (1883-4).
 Ascher. und Graeb. Syn. Mit. Fl. III. 513 (1906).

SYNONYMS.

- Xiphium vulgare*, Miller, Gard. Dict. ed. VIII. no. 2 (1768).
 Baker in J. L. S. XVI. p. 122 (1877).
Xiphium verum, Schrank, Flora VII (1824), 2. Beibl. 16.
I. variabilis, Jacq. Coll. II. 321 (1788) (? a garden hybrid).
 Richter, Plant. Eur. I. 258 (1890).
I. coronaria, Salisb. Prodr. p. 45 (1796).
I. lusitanica, Hort. ex Steud. Nom. ed. I. p. 438 (1821).
I. serotina, Willkomm in Willk. et Lange, Prod. Fl. Hisp. I. 141 (1861).
I. lusitanica, *Ker-Gawl. in Bot. Mag. t. 679 (1803).
Xiphium sordidum, Soland. ex Salisb. in Trans. Hort. Soc. I. (1812), p. 303, non Retz. nec Willd.
 [This is said to vary exceedingly in the colour of its flowers and is obviously a garden plant.]
I. spectabilis, Spach. in Ann. Sc. Nat. Sér. III. v. p. 93 (1846).
I. Taitii, Foster in Gard. Chron. 1906, II. p. 145.

[N.B. There are undoubtedly yellow-flowered forms of this Iris to which the varietal name of *I. lusitanica* is traditionally applied (see also p. 214). The figure in the Bot. Mag. t. 679 probably only represents a garden form and the statement that the plant figured was identical with Solander's *Xiphium sordidum* (cf. l.c.) is of little value for Salisbury distinctly states that his plant sported exceedingly in the colour of the flowers. The latter was therefore presumably also a garden form.

I have had in cultivation some bulbs of the Iris that Foster named *I. Taitii* sent to me by Mr A. W. Tait himself and I cannot distinguish the plants either in growth or in the flowers from slender forms of *Xiphium* except in their habit of flowering late in June or even in July. Willkomm's *I. serotina* was probably a similar form. Cf. Reverchon's specimens (E), from the Sierras de Cazorla and del Pinar, at a height of 5400 and 5100 ft, which flowered in September and August respectively.]

DISTRIBUTION. The South of Spain and Portugal, the South of France, the North of Africa.

Spain and Portugal. Serra de Monsanto, 1880, Moller (B) (K).

Cintra, 1888, Murray (BM).

Lake Albufeira, 1844, Willkomm (E) (B).

Arrabida, 1851, Welwitsch (K).

Estremadura, 1848, Welwitsch (BM).

Villanova de Portimão, 1876, Hackel (V) (B).

Loulé, 1881, Daveau (C) (K).

Sanlucar de Barameda, 1849, Bourgeau (C) (K).

Seville, 1877, Joad (K).

Cuenca (Cordoba), 1898, Gandoger (V).

Algeciras, 1845, Willkomm (K).

Sierra del Pinar, 1900, Reverchon (E).

Sierra d'Estepona, 1837, Boissier (K) (V) (B).

Sierra de Mijas, 1837, Boissier (K) (V) (B).

Sierra de Ronda, 1889, Reverchon (E).

Sierra de Cazorla, 1901, Reverchon (E).

R. Monachil, 1847, Schimper (B).

Las Alpujarras, 1903, Gandoger (B).

Sierra de Gador, 1902, Gandoger (B).

Miranda do Douro, 1888, de Mariz (B).

Albaceta, 1891, Porta et Rigo (BM) (E).

Valencia, 1846, Willkomm (BM).

Teruel, 1895, Reverchon (BM) (E) (V) (B).

France. Béziers (Roquehaute), 1856, Grenier (BM), 1862, Cosson (E), 1865, Thielens (BM), 1867, — (V).
 Between Roquehaute and the sea, 1912, Denis (HortD), found in full flower on July 1st.

- Vias, 1892, Maudon (B).
 Hérault (Portirayne), 18—, — (V).
 Vallée du Lys (Haute Garonne), 1849, — (E).
North Africa. Oran, —, Munby (K).
 Oran, 1877, collected for Maw (K).
 Tangier, 1878, Elwes (K).
 Algeria, 1910, Mermier (HortD).

[N.B. The following specimens are identified as *I. lusitanica*, which probably means that they had yellow as opposed to purple flowers (cf. p. 213). It is however impossible to decide from a dried specimen after the lapse of several years whether the flower was yellow, for sometimes the purple entirely disappears and leaves only a dull yellow in the dried state. White flowers give much the same result.

Moreover the wide distribution of these yellow-flowered specimens is probably to be explained by the fact that this form, though less common, is liable to occur wherever the type is found. A parallel is found in such species as *I. pumila* (see p. 144) and *I. chamaeciris* (see p. 140), to quote only two instances among many. Moreover, it is not unlikely that the same phenomenon occurs in the case of this species as certainly occurs in the case of the two above-mentioned *Pogoniris*, namely that in some localities only one colour form is found, whereas in others many forms occur in close proximity.]

- Portugal.* Cintra, 1846, Trevelyan (K).
 1851, Welwitsch (K).
 1876, Hackel (V).
 1887, Moller (B).
 1911, Tait (HortD).
 Collares, 1879, Ball (K).
 Lisbon; Monsanto, 1880, — (K).
 1876, Winkler (B).
 Alcantara, 1880, Daveau (K) (C).
 18—, Hb. Link (B).
 Estremadura, 1848, Welwitsch (O) (C) (V).
Spain. Torrelodones (Madrid), 1864, Madua (K).
 Blanco (Jaen), 1849, — (B).
France. Vias between Agde and Béziers, 1857, Fabre (K).

Diagnosis.

I. xiphium Xiphion; *bulbus* tunicis membranaceis tenuibus involutus; *perigonii tubus* brevissimus.

Description.

Rootstock, an ovate bulb covered with thin membranous tunics not splitting into fibres at the apex and producing bulblets in pairs on opposite sides at the base (see Plate XLIII).



FIG. 27. Spathes and capsule of *I. xiphium*.

Leaves, 12—24 in. long, glaucous, channelled.

Stem, 12—18 in. high, usually with only one head of flowers but occasionally a very strong bulb will produce a side branch, very similar to those of *I. spuria*.

Spathe valves, up to 4 or 5 in. long, narrow, green, 1—2-flowered.

Pedice, varying in length, often equal to, or a little longer than, the spathes, that of the second flower being the shorter.

Ovary, 1—1½ in. long, oblong, narrow, usually exserted from the spathes.

Tube, practically none.

Falls. The suborbicular blade is separated by a gradual and slight constriction from the oblong-oval haft. The colour is very variable but there is always a yellow or orange streak or patch on the blade. The oblique veining on the sides of the haft is usually conspicuous.

Standards, oblanceolate-unguiculate, usually of a slightly different shade of colour to that of the falls.

Styles, broader than the haft of the falls.

Crests, subquadrate, large.

Stigma, bifid, with two rounded teeth.

Filaments, varying in colour.

Anthers, varying in colour.

Pollen, yellow or orange.

Capsule, long and narrow (2—3 in.), with a hollow running down each face (cf. Fig. 27).

Seeds, small, yellow-brown, thick D-shaped, compressed.

Observations.

There is little doubt that Linnaeus included under the one name of *I. xiphium* both that species and also *I. xiphioides*. This is clear from the fact that he quotes C. Bauhin, Pinax, p. 38 *I. bulbosa latifolia, caule donata*, which is almost



Iris sibirica

certainly *I. xiphioides*, and also the Hortus Cliffortianus which refers us to Bauhin's *I. bulbosa lutea inodora*, which in its turn is based on Clusius, *Hisp.* p. 276 *I. bulbosa angustifolia flore luteo*, which is undoubtedly a form of *I. xiphium*. (Cf. the specimen, named *I. xiphium*, in the Smithian Herbarium at the Linnaean Society which is obviously *I. xiphioides*.)

This confusion is the more surprising in view of the fact that in this case, as in several others, Clusius was well aware of the difference between the two species and carefully described them both.

There are doubtless many forms of this Iris even in the wild state but we should scarcely be justified in separating as species forms which differ merely in size or in the time at which they flower. The largest, as well as the earliest, form is probably that which is known to dealers as "*I. filifolia*." It has nothing to do with the true *I. filifolia*, as will be seen by comparing Plates XLIII and XLIV. The *pseudo-filifolia* has the characteristic short tube of *I. xiphium*, while that of *I. filifolia* is always of some length. Another obvious difference is to be found in the shape of the standards. This *pseudo-filifolia* flowers in April and May and grows apparently in the neighbourhood of Gibraltar, while the true plant grows actually on the Rock itself.

On the other hand, at an altitude of over 5000 feet, further north, specimens of *I. xiphium* are found which do not flower until August or September. The Roquehaute form also flowers late.

Many garden forms of this Iris have long been known. Gerard in his Herball (1597) mentions among "certaine bulbose or Onion rooted Flower-de-luces" an *Iris bulbosa flore vario* and the name probably means that he knew more than one form of the plant. The Hortus Eystettensis (1613) has about a dozen forms and in Simula's Flora exotica (1720, BM) eight varieties are depicted.

In recent years many fine large-flowered forms have been introduced into cultivation under the name of Dutch Irises. These were raised by the well-known firm of C. G. Van Tubergen, Junr., of Haarlem, who tell me that *I. Boissieri*, *I. tingitana*, and other species were used as well as *I. xiphium*. The pollen of these species seems however to have had little effect except in increasing the vigour of the plants and the size of the flowers, for I can see no trace in any of the specimens that I have grown or seen illustrated of the long perianth tube that is found in all the species except in *I. xiphium*. It may be that the absence of tube is dominant over its presence and that specimens with obvious linear perianth tubes will occur in the next generation of these hybrids, but on the other hand there is no doubt that hybrids with flowers at least as early and as fine as those of these Dutch Irises can be obtained by crossing the early form of *I. xiphium* already described, and for which *I. xiphium* var. *praecox* would be a not inappropriate name, with pollen of garden varieties of *I. xiphium*. This, at least, has certainly been the result of some crosses which I made several years ago and from which I have obtained a number of fine seedlings, which come into flower in the last week of May.

The absence of the linear perianth tube in any of these so-called Dutch Irises is the more remarkable because there is in existence a hybrid of *I. tingitana* crossed with pollen of *I. xiphium*, raised by Foster, in which the linear tube is half an inch or more long. This hybrid is of great garden value for the growth and the flowers are practically identical with those of *I. tingitana* and yet the plants flower freely and the flowers survive when those of *I. tingitana* succumb in the bud stage to late spring frosts. In 1912 this hybrid was actually in flower in the open on April 15th in Surrey.

For the cultivation of *I. xiphium*, see the introduction to the section, p. 210.

† *I. JUNCEA*

Poiret, Voy. Barb. II. 85 (1789).

*Desfontaines, Fl. Atl. I. p. 39, t. 4 (1798).

Gussone, Suppl. Fl. Sic. Prod. p. 159 (1832).

Synopsis Florae Siculae, I. p. 40 (1842).

Munby, Fl. Alger. p. 6 (1847).

Willdenow, Sp. Pl. I. p. 235 (1797).

*The Garden, Dec. 10th, 1898.

Richter, Plant. Eur. I. p. 258 (1890).

SYNONYMS.

Xiphion junceum, Parlat. Fl. Ital. III. p. 304 (1858).

Klatt in Linnaea XXXIV. p. 570 (1866).

*Bot. Mag. 5890 (1871).

Baker in Journ. Bot. 1871. p. 41.

in J. L. S. XVI. p. 123 (1877).

Diaphane stylosa, Salisb. Trans. Hort. Soc. I. p. 305 (1812).

Iris imberbis, Asch. und Graebn. Syn. Mit. Fl. III. p. 514 (1906).

[Poiret's description begins with the words "*Iris juncea imberbis*." Klatt in Linnaea XXXIV. 570, misquotes this as *Iris imberbis* and Ascherson und Graebner, Syn. Mit. Fl. III. 514, accordingly make *I. imberbis* the name of the species!]

Iris mauritanica, Ker-Gawl. in Kon. and Sims, Ann. Bot. I. p. 244 (1804).

DISTRIBUTION. North Africa and Sicily¹.

Sicily. Palma, 1847, Tineo (K) (V) (B).

¹ The statement that this species is a native of Liguria rests on Gussone's citation (v. supra) of specimens collected at Porto Maurizio on the Riviera di Ponente by Gentili and at Porta degli Angeli near Genoa by De Notaris. The statement is unverified. Specimens from the Serra de Monsanto near Lisbon are *I. xiphium* var. *lusitanica*.

- North Africa.* Atlas Mts, —, Desfontaines (V).
 Tangier, Djebel Kebir, 1802, Schonsboe (BM) (V).
 Tangier, 1821, Rouschet-Doumeny (K).
 1825, Salzmann (K).
 Algiers, 1832, Schimper (K) (BM) (V) (B).
 1837, Bové (K) (B).
 Hamman Meckontier, 18—, Julien (B).
 Baba Aly, 1850, Jamin (K) (V) (B).
 Maison Carrée, 1882, Joad (K).
 1879, Gandoger (BM) (B).
 Constantine, 1876, Munby (K).
 1856, Choulette (K) (BM) (V) (B).
 Bône, 1866, Tribout (K) (BM) (V), 1870, Braun (B).
 Tunisia, 1883, Cosson, 1885, Robert (K).
 Ras Kamart, 1888, Barratte (K) (B).
 Gardimau, 1884, Ross (B).

Diagnosis.

I. juncea Xiphion; *bulbus* subrotundus, tunicis nitide coriaceis, rufescentibus involutus; *perigonii* *tubus* elongatus; *segmenta omnia* aurea, interiora exterioribus breviora.



FIG. 28 a. Bulb of *I. juncea* showing the stiff bristles into which the outer coats split in their upper half.



FIG. 28 b. Bulb of *I. juncea* with outer coats removed.

Description.

Rootstock, a bulb more globose than that of *I. xiphium*, wrapped in a number of somewhat thick and rigid smooth reddish brown tunics, which break up into stiff points at the top (cf. Fig. 28).

Leaves, slender, rushlike, 18—24 in. long, shooting in England in early autumn (October).

Stem, about 12 in., bearing one or two flowers, the second raised on a longer pedicel.

Spathe valves, lanceolate, narrow, scarious at the tips only, not quite so ventricose as in *I. xiphium*. 3—3½ in. long.

Pedicel, short, about ¼ in., increasing to ½ in. and 1¼ in. at the fruiting stage.

Ovary, triangular, with sides almost flat, not grooved as in *I. xiphium*.

Tube, slender, 1½—2 in. long, triangular in section.

Falls, of a deep yellow colour (except in the variety *numidica* or *Mermieri* which is of a paler shade), with a nearly orbicular or heart-shaped emarginate blade, separated by a slight constriction from the short haft. There are usually a few faint brown veins on the haft and lower part of the blade. 2¼ in. by 1¼ in.

Standards, much shorter than the falls, oblanceolate, unguiculate, emarginate, spreading, not erect. 1¾ in. by ½ in.

Styles, large and broad, 1½ in. long, acutely keeled.

Crests, large, quadrate, with serrated upper edge reflexed.

Stigma, bilobed with two pointed teeth.

Filaments, deep yellow, equal in length to the anthers.

Anthers, cream.

Pollen, yellow.

Capsule, 1½—3 in. long, rounded, trigonal, with deeply grooved sides so as to be nearly trefoil in section.

Seeds, small, wedge-shaped or cubical, dark brown with small paler appendage.

Observations.

This fine Iris is very distinct in appearance and shape from all the other members of the Xiphion group. This arises from the fact that the substance of the blade of the falls is much thinner and more flimsy than that of the others. The large blades of the falls therefore hang perpendicularly and give the flowers a characteristic outline.

I. juncea is also distinguished by the thick leathery texture of the outer tunics of the bulbs, which split up into fibres at the top (see Fig. 28).

This Iris needs a warm position in well-drained soil that is kept dry in summer. Unless these conditions are provided, the bulbs do not get that summer ripening, which is essential to their wellbeing. This annual rest, if not obtained naturally, should be provided artificially by lifting the bulbs when the foliage withers, and storing them in dry sand for a month or two. Seedlings of this species appear to

be more tender than those of any other species of *Xiphium* and are killed or injured by frosts that leave the others unharmed. They should therefore be grown either in a frame or in a position where they can be easily protected in bad weather.

†*I. BOISSIERI*

- Henriques, Bol. Soc. Broter. III. 1885, 183, t. 3.
- Willk. Ill. Pl. Hisp. II. t. 118 (1886-92).
- Foster in Gard. Chron. 1887, II. p. 38.
- Baker in Bot. Mag. t. 7097 (1890).
- Journ. Hort. Soc. XXVIII. fig. 122 (1903-4).

SYNONYMS.

- I. heterophylla*, Merino, Boletín de la Sociedad Aragonesa de Ciencias Naturales, VII. p. 131 (1908).
 - I. diversifolia*, Merino, l.c. p. 225.
- Flora de Galicia, III. p. 149, figs. 1 and 2 (1909).

DISTRIBUTION. The Serra de Gerez in Portugal at a height of 2000—3000 feet.

Serra de Gerez, 1887, Murray (BM).
1884, Moller (B).
1888, Murray and Tait (B).

[N.B. By a curious mistake the letter-press of the Botanical Magazine figure puts the Serra de Gerez in the south of Portugal. As a matter of fact it is in the extreme north on the Spanish frontier. That *I. Boissieri* extends over the border is shown by Merino's specimens, which were collected near the river Limia in the Spanish province of Orense. It is noticeable that Merino does not mention *I. Boissieri* in his description of his supposed new species.]

Diagnosis.

I. Boissieri Xiphion; *segmenta exteriora* luteo-barbata.

Description.

Rootstock, a slender bulb with faintly ribbed brown tunics.

Leaves, linear, very deeply channelled, slightly ribbed on the outside, about a foot long, of a light yellowish green.

Stem, about 12 in. high, bearing one or two flowers, hidden, except for the upper inch or two, by three sheathing leaves.

Spathe valves, light yellowish green, not at all scarious, rather navicular, 2 in. long.

Pedice, $\frac{1}{2}$ in.

Ovary, $1\frac{1}{2}$ in. acutely trigonal.

Tube, about $1\frac{1}{2}$ —2 in. long, slender.

Falls. The obovate blade narrows somewhat suddenly to the wedge-shaped haft. The colour is a rich blue purple with conspicuous red-purple veins. There is a narrow pointed signal patch of yellow, which becomes a yellow streak along the otherwise reddish-purple haft. Along this yellow streak and almost to the end of the patch runs a beard of thin yellow hairs. 2 in. by $\frac{3}{4}$ in.

Standards, obovate, gradually narrowing to the short haft, purple in the upper part and reddish below, erect not connivent, $1\frac{1}{2}$ in. long by $\frac{5}{8}$ in. broad.

Styles, held close down on falls, reddish purple with dark streak along the central ridge.

Crests, triangular, darker than the styles.

Stigma, deeply bilobed.

Filaments, short.

Anthers, large, slightly longer than the filaments.

Pollen, yellow.

Capsule, trigonal, narrow with shallow groove on either side, $1\frac{1}{2}$ in. by $\frac{1}{4}$ in., of a light terracotta colour.

Seeds, small, spherical or pyriform, dark reddish brown, occasionally somewhat flattened.

Observations.

This is one of the most distinct of the Spanish Irises, from all the rest of which it differs in having a conspicuous beard of bright yellow hairs.

It is apparently confined to the Gerez mountains in Northern Portugal and even there it is becoming rare owing to the depredations of reckless collectors. Unfortunately, too, it is not absolutely hardy in England, certainly not so hardy as the ordinary Spanish Irises. The severe winter of 1908-9 killed all my bulbs, including even a number of seedlings which had not flowered.

It needs therefore either a warm position or the shelter of a frame to do well and succeeds best in a soil rich in humus and well drained. In any case the bulbs should be lifted in early August and kept in sand for a few weeks, to ensure their having a thorough rest before growth begins again with the autumn rains.

I am told by Mr A. W. Tait, Baron de Soutellinho, of Oporto, who knows the plant in its home, that it is difficult to grow anywhere except in its native soil. He adds that the best way to cultivate it is to plant the bulbs in large pots, well drained, in a mixture of granite sand, well decayed peaty mould and a little loam and to keep them dry from July to October.

The flowers respond readily to artificial fertilisation and set seed abundantly. It is, therefore, not impossible that the descendants of wild plants may in a few generations become more accustomed to our climate and give us in larger quantities than are now available a very welcome addition to the group of Spanish Irises.

At present no hybrid of *I. Boissieri* is known, though, among the above-mentioned seedlings killed by the severity of the winter of 1908-9, there were the results of several crosses with *I. xiphium* and kindred species. It was particularly vexatious to lose such seedlings for it would be interesting to see how the bearded character would behave in the cross and whether the beard would be a common feature among the hybrid plants. It is a point that is worth investigation for it may have some bearing on the question of the descent of the various species of Iris from an original archetype.

† *I. FILIFOLIA*

(PLATE XLIV)

The specimen illustrated was obtained from bulbs sent from Gibraltar.

•Boiss. Voy. Esp. p. 602, fig. 170 (1839-45), non Bunge.

•Foster, Bulbous Irises, p. 68 (1892).

SYNONYMS.

Xiphion tingitanum, •Hooker f. in Bot. Mag. 5981 (1872).

[The type is in Hb. K. grown from bulbs collected ten miles south-west of Tangier.]

Xiphion filifolium. Klatt in Linnaea, xxiv. p. 571 (1866).

•Hooker f. in Bot. Mag. 5928 (1871).

[The type is in Hb. K. and was found by Maw eleven miles west of Tangier.]

DISTRIBUTION. The south of Spain and North-west Africa.

Gibraltar, 1841, Hb. Lemann (C).

1851, Ball (E).

1873, Maw (K).

1910, Frere (HortD).

Alameda, 1869, Maw (K).

Sierra de Mijas, 1879, Porta et Rigo (C) (V) (B).

Sierra de Grazalema, 1890, Reverchon (E), sub nomine *I. Fontanesii*.

Tangier, 1871, Maw (K).

Ball (K).

Hooker (K).

Tetuan, —, Webb (K).

South Morocco, 1907, Bainbridge (K).

Diagnosis.

I. filifolia Xiphion; *perigonii* *tubus* elongatus; *segmenta* omnia rubro-purpurea nec coerulea, interiora exterioribus aequilonga obusa nec lanceolata.

Description.

Rootstock, an ovate bulb, with slender, scarcely ribbed outer tunics.

Leaves, 12 or more inches long, very slender and tapering, 5-7 in number, the uppermost being much reduced; the leaves of non-flowering bulbs are much longer, 2 or more feet in length.

Stem, about 12 or 18 inches high, bearing a single, usually 2-flowered head.

Spathe valves, pointed, rigid, green, sharply keeled, the inner valve being slightly longer than the outer, $2\frac{1}{2}$ -3 in. in length.

Pedicel, 1- $1\frac{1}{2}$ in., growing eventually to as much as 3 in.

Ovary, an inch or slightly more in length, much rounded trigonal, with a groove running down each face.

Tube, $\frac{1}{2}$ -1 in., slender.

Falls, $2\frac{1}{2}$ inches in length, the panduriform haft being longer than the orbicular blade. The colour is of a rich reddish purple with darker veins set off by an orange signal patch, which ends broadly on the blade, not narrowing to a point. There is also a slightly raised central orange ridge.

Standards, distinctly obovate unguiculate with a blunt emarginate end. The colour is similar to that of the falls.

Styles, broad, of the same colour.

Crests, large, quadrate, with serrate upper edge.

Stigma, bilobed.

Filaments, slightly longer than the anthers.



Anthers, cream.

Pollen, yellow.

Capsule, 2—2½ in. long, narrow, rounded trigonal, with deeply grooved sides.

Seeds, small, wedge-shaped, wrinkled, of a rather yellowish brown, very numerous, as many as 236 having been counted in a single capsule.

Observations.

The name of this species is perhaps a little misleading, for although in some specimens, especially in the case of non-flowering bulbs, the leaves are very long, narrow and threadlike, yet in others they are distinctly stouter. This variability of the foliage has led to some confusion owing to the fact that a stout form was figured in the Botanical Magazine as *Xiphion tingitanum* (cf. synonymy). *I. filifolia* differs from *I. tingitana* in its broad, bluntly rounded standards and in its colour. It is perhaps one of the most striking of the *Xiphium* section. Its rich red-purple flowers are of a shade that is not found elsewhere. Another peculiarity is that the central orange patch is surrounded by a halo of blue. A microscopic examination reveals the fact that no blue pigment is present and that the blue colour is produced by a mixture of the orange and the red-purple cells, where the two colours run one into the other.

This Iris does not seem to be any more difficult to cultivate than the other members of the group. See p. 210. Its leaves shoot in autumn and yet plants from Spain, at any rate, have remained untouched by twenty degrees of frost, when the foliage of *I. tingitana* has been severely crippled. It does not flower until June.

† *I. TINGITANA*

Boiss. et Reut. Pugill. Pl. Nov. 113 (1852).

*Bot. Mag. 6775 (1884) (Type in Hb. K.).

*The Garden, 1888.

Journ. Hort. Ser. III. 4, p. 429.

Gard. Chron. 1905, XXXVII. 339.

1906, XL. 24.

1910, XLVIII. 16—17.

SYNONYMS.

I. xiphium, Desfontaines, Fl. Atlant. I. 37 (1798).

I. Fontanesii, Baker, Hdk. Irideae, p. 40 (1890) from Gren. et Godr. Fl. de France, III. 245 (1855—6). See Observations.

Xiphion Fontanesii, Baker in J. L. S. XVI. p. 123 (1878).

DISTRIBUTION. Morocco.

Tangier, 1800, Durand (BM).

1825, Salzmann (K).

N. Morocco, 1886, Moseley (B).

Alcazar (Kloot Country), 1878, Brady (K).

Rabat (Tomara Forest), 1887, Grant (K).

Morocco, 17—, Desfontaines (P).

Diagnosis.

I. tingitana Xiphion; *I. xiphio* affinis sed *perigonii* *tubus* elongatus; *segmenta* omnia coerulea, interiora lanceolata.

Description.

Rootstock, an oval bulb, tapering to a point above, the outer tunics being thin, of a reddish-brown colour, smooth with well-marked veins.

Leaves, six or seven to each plant, usually springing from a clasping red-spotted sheath at the ground line, rigid, channelled, the outer side glaucous green, conspicuously striated, the inner surface silvery grey, about a foot to 18 in. in length.

Stem, 18—24 inches high, completely hidden in the clasping leaves.

Spathe valves, 4—6 in. long, keeled, pointed, bright green, with a membranous edge and tip, 1—2 flowered.

Pedicel, an inch or more in length.

Ovary, 1½ in. long, trigonal, narrow with deeply grooved sides and thin walls.

Tube, 1½—2 in., hardly visible between the diverging tips of the spathes (cf. Fig. 29).

Falls. The purplish haft becomes rapidly wider immediately above the base and then narrows before expanding into the almost orbicular blade, of which the groundwork is a light whitish blue with darker purplish veins radiating out towards the margin. A patch of yellow surrounds the end of the raised, almost orange, central ridge, which sinks into a greenish stripe along the haft.

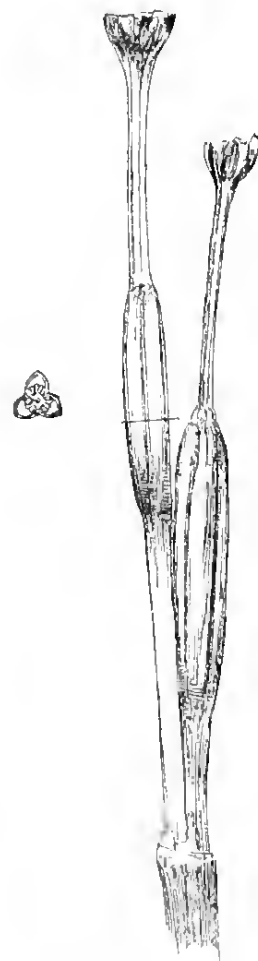


FIG. 29. The inflorescence of *I. tingitana*, showing the long perianth tube.

Standards, linear lanceolate, with a canaliculate haft, 3—4 in. long by $\frac{1}{2}$ — $\frac{3}{4}$ in. wide, with a wavy edge, rather darker in hue than the blade of the falls, erect, slightly connivent.

Styles, of the same colour as the standards, becoming very wide in the upper part.

Crests, large, almost quadrate, fluted.

Stigma, bilobed.

Filaments, cream or colourless, about equal in length to the anthers.

Anthers, $\frac{3}{4}$ in. long, pale yellow.

Pollen, orange.

Capsule, long, narrow, triangular with a broad groove on each side.

Seeds, light brown, small, thick D-shaped.

Observations.

The flowers of this species are larger than those of any other member of the Xiphion group. They are distinguished by the long perianth tube (see Fig. 29) and by the tapering, pointed standards.

There is little doubt that the foliage of this plant varies considerably in size and sturdiness, the variation being determined either by the soil or by the climate of the locality in which the plants grow.

Apparently the plant was first found by Desfontaines and wrongly referred to *I. xiphium*. Grenier and Godron saw that the presence of a perianth tube of some length made it impossible to refer Desfontaines' specimens to that species and it is curious that it should not have occurred either to them or to Baker to compare them with *I. tingitana*. An examination of the Paris specimens showed, besides the long tube, the characteristic, pointed, tapering standards and left no doubt in my mind as to their identity with *I. tingitana*.

It is unfortunate that this Iris, owing to its early flowering date, can seldom be induced to flower in most English gardens without special treatment. When grown under the same conditions as *I. xiphium*, it remains flowerless year after year, although the bulbs attain a considerable size and produce numerous offsets. In order to induce it to flower, *I. tingitana* must be given very rich soil and a warm position. A thick layer of several inches of old manure should be placed beneath the bulbs, which may themselves be surrounded with silver sand. A warm and sheltered situation is necessary and some protection from late spring frosts, which have sometimes been known to nip the flowers of this species in the bud in the month of April.

One of the most successful of Sir Michael Foster's hybridisations was the crossing of *I. tingitana* and *I. xiphium*. The former was probably the seed parent and there is little evidence of the influence of *I. xiphium* in the hybrid except in the fact that it flowers as readily as *I. xiphium* and is as easy to manage. The flowers and foliage are almost identical with those of *I. tingitana* and the linear tube of the latter is also present.

THE RETICULATA SECTION

The members of this well-marked section are characterised by the netted coat of the bulbs, by the short, one-flowered stem, and by the peculiar character of the leaves. These are either four-ribbed (*I. reticulata*, Plate XLV) or eight-ribbed (*I. Bakeriana*, Plate XLV). Difficulties arise when we endeavour to separate those plants, which have four-ribbed leaves, and to give them specific names, for there is no doubt that the Caucasus, Asia Minor, and Syria contain a vast number of local forms. On the whole, I am inclined to think that these fall into two main natural classes, which differ in the character of the bulb or rather in its mode of increase. When a cluster of ripe bulbs of *I. reticulata* is lifted, it will be found to consist of a relatively small number of bulbs, about half of which are of flowering size, and the rest of such a size that a year's, or at most two years' growth, will bring them to flowering strength. On the other hand, bulbs of *I. hystrix* will be found surrounded at the base by a large number, often as many as 20 or 30, of minute bulblets not much bigger than grains of wheat, which take three or four years to arrive at flowering size.

The first of these two classes appears to be confined to the Caucasus region, and the latter includes the Asia Minor and Syrian forms. Unfortunately, herbarium specimens are of little assistance in deciding to which of the two classes a plant belongs, for the reason that these specimens are mostly collected when the plant is actually in flower. At that time the substance of the old bulb has been mostly absorbed in the effort of flowering, and the bulbs for the next year are hardly discernible within the old outer netted coat.

The number of specific names that are bestowed within the limits of these two classes must depend on the view we take of what constitutes a species. The typical blue violet, *I. reticulata* (Plate XLV), is probably the rarest form in its native habitat, where red purple forms, to which the name *Krelagei* is usually applied, are far more common. Moreover, in any batch of seedlings from the blue type, red purple forms predominate¹, and in view of this it is certainly curious that some red

¹ My own experience of several annual batches of seedlings raised from self-fertilised seed of the so-called type has been that not one blue-violet flowered example has occurred. The seedlings have all without exception been of a deep red purple

purple forms are always in flower at least a fortnight, if not a month, earlier than the typical *I. reticulata*. Why the change in colour should retard the flowering is not apparent, but I have never known the type to flower until some weeks later than the first *Krelagei*.

The polymorphous character of *I. histrio* was well illustrated by a number of bulbs that I received some years ago from Marash in Asia Minor. They all agreed in having the divergent standards, which I take to be typical of *I. histrio*¹ (cf. Plate XLVI), but differed to an extraordinary extent in colour and marking. Some were much blotched, others were hardly blotched at all but merely veined, some were pale blue, others dark, and one was the remarkable form that I have named *atropurpurea* (see Plate XLVI, Fig. 3).

In cultivation, the *reticulata* Irises are capricious. In some situations, they become diseased² and die out, with the exception perhaps of one or two small bulbs, which persist and grow into flowering clumps a few years later. This disease appears to be most easily held in check when the bulbs are lifted every other year. This frequent lifting may be troublesome, but it has the additional advantage that the flowers are displayed to much better advantage when the shape of each stands out distinct and is not merged in a mere mass of brilliant colour.

My own practice has been to lift the bulbs soon after the leaves have died completely away, and to treat them for disease as suggested at p. 16. They are then dried in the shade and packed away in dry sand until September or early October, the earlier date for replanting being on the whole preferable.

As regards soil, the chief recommendation is to ensure efficient drainage and the presence of some lime. If the natural soil is very poor sand, it is well to enrich it with a heavy dressing of well decayed leaves and crumbled clay. The addition of old manure produces very large bulbs, but tends, I think, to introduce disease.

All the forms of *I. reticulata* are liable to be fertilised by insects, though the capsules thus obtained are rarely as full of seeds as those that result from the artificial pollination of all the three stigmas of the flowers.

Seeds may be sown in the open about $\frac{1}{2}$ an inch deep in fairly rich light soil, and the bulbs may either be left to flower on the spot, or perhaps preferably be lifted after two years and replanted in rows a few inches apart. They should flower in their third or fourth year.

A curious point will be noticed in the development of the flowers of these Irises. The growth of the buds inside the spathes is slow but, once the spathe bursts open and reveals the bud, growth for a short time is extraordinarily rapid, and I have actually measured it as one inch in seven hours and two and a half inches within twenty-four hours.

An apology must be made for the inartistic means adopted in order to economise space in the illustrations of these Irises. It was impossible to include a complete drawing of each plant, and it is hoped that the habit of growth is sufficiently indicated by the drawing of *I. reticulata*, and by the descriptions given in the text of the other species.

Analytical Key to the Reticulata section.

- | | | |
|----|---|---|
| 1. | { Leaves tubular with 4 or 8 ribs. | 1. |
| | { Leaves linear, channelled, with thickened edges. | <i>I. Kolpakowskiana</i> ³ (p. 228). |
| 1. | { Leaves tubular with 8 ribs at equal intervals. | <i>I. Bakeriana</i> (p. 227). |
| | { Leaves tubular with 4 ribs at unequal intervals. | 2. |
| | { Inner segments (standards) reduced to mere bristles. | <i>I. Danfordiae</i> (p. 226). |
| 2. | { Inner segments (standards) approximately equal in length to the outer segments (falls). | 3. |
| | { Bulbs producing comparatively few offsets, each of considerable size. | <i>I. reticulata</i> (p. 222). |
| 3. | { Bulbs producing a large number (15—25) of very small offsets. | 4. |
| | { Flowers produced with or before the leaves. | <i>I. histrioides</i> (p. 224). |
| 4. | { Flowers overtopped by the leaves. | <i>I. histrio</i> (p. 223) and its subspecies <i>I. Vartani</i> (p. 225). |

colour and tallied with the description of *I. Krelagei*. The seedlings observed resulted from seeds saved in several consecutive years and certainly present a puzzle, for no Mendelian hypothesis will explain the change of colour. Even if the type were an F_1 hybrid and the colour of *Krelagei* acted as a dominant, it is remarkable that no trace of the recessive character has appeared. It is also noteworthy that, although the pollen of the type is invariably of a golden yellow colour, the seedlings have either white or yellow pollen in approximately equal numbers.

¹ Reichenbach's original description neglects the point but his expression "petalis longe unguiculatis" is more suited to this form than to those with upright standards (see Plate XLV) and moreover the feature is clearly brought out in the figure in Foster's *Bulbous Irises*, p. 8.

² For this disease and its treatment see p. 16.

³ *I. Winkleri* is possibly, and indeed probably, a synonym of *I. Kolpakowskiana*. It is said to differ by having smooth and not netted coats to its bulbs. But herbarium specimens might easily have lost their outer coats, as was the case with the first bulbs of *I. Danfordiae* that were described.

††*I. RETICULATA*

(PLATE XLV, FIG. 1)

- M. Bieberstein, Flor. Taur. Caucas. I. p. 33 (1808), *Cent. Plant. rar. Taur. Caucas. I. t. 11 (1810)¹.
 *Regel, Gartenflora, XIII. (1864), pp. 132, 323, t. 452.
 *Bot. Mag. t. 5577 (1866). [Specimen from Persia apparently intermediate between the type and *Krelagei*.]
 *Eeden, Album, t. 30.
 *Regel, Gartenflora, 1873, p. 354, t. 779, fig. 1.
 Gard. Chron. *1879, I. p. 501, fig. 69, *1884, I. p. 217, figs. 41, 43, 44.
 1885, I. p. 567, 1909, p. 55.
 Boiss. Fl. Or. v. p. 120 (1884).
 Le Jardin, 1888, p. 139.
 *Revue Horticole, 1890, p. 133.
 *Journ. Hort. Soc. XXVIII. fig. 115 (1904).

SYNONYMS.

- Neubeckia reticulata*, Alefeld in BZ. XXI. 1863, p. 297.
Xiphion reticulatum, Klatt, Linnaea, XXXIV. 1866, p. 572.



FIG. 30. Spathes, capsule, and withered perianth tube of *I. reticulata*, and capsule of *I. Danfordiae*.

- Var. *Krelagei*, *Regel, Gartenflora, 1873, p. 354, t. 779, fig. 2.
 *Sweet, Brit. Flow. Garden, ser. II. vol. II. t. 189 (1833).
 *Lodd. Bot. Cab. t. 1829 (1832).
 *Gard. Chron. 1884, I. p. 217, fig. 42.
 *Rev. Hort. Belg. 1892, p. 60.
 *Journ. Hort. Soc. XXVIII. fig. 121 (1904).

Var. *humilis*, Foster, Bulb. Irises, p. 59 (1892).

Var. *cyanea*, *Regel, Gartenflora, 1874, p. 162, t. 797, fig. 1.

Var. *purpurea*, Leichtlin ex Foster, Bulbous Irises, p. 60 (1892).

[N.B. No specimens of these three plants are apparently now obtainable and it is uncertain whether they belong here or whether they should be classed with *I. histrio*. There is in cultivation yet another variety under the name of *Melusine*†, which may conceivably be the *cyanea* of Regel. It is a somewhat slender plant and the flowers, though variable in colour when raised from seed†, are always of some shade of grey or purple blue, very different from the deep-blue violet of the so-called type. In the best examples the colour is an approach to a light Cambridge blue. Whatever may be the origin of the plant, it is certainly more closely allied to *I. reticulata* than to *I. histrio*.]

DISTRIBUTION. The Caucasus. The type and *Krelagei*.

- Caucasus (Georgia), 1831, Hohenacker (K) (C) (V).
 Caucasus, 1831, Prescott (K).
 Caucasus, Tiflis, 1909, Bot. Gard. (HortD).
 [These specimens all produced red-purple flowers.]
 Tiflis, 1882, Schumann (V).
 —, Szovits (V) (B).
 1829, Steven (V).
 —, Koch (B).
 Talysch, 1848, Buhse (V).

Diagnosis.

I. reticulata Xiphion; *bulbus* tunicis reticulatis instructus; *folia* basi vaginis albis elongatis obtecta, praesubulata, tetraquetra; *caulis* obsoletus; *tubus* gracillimus, 3-pollicaris.

Description.

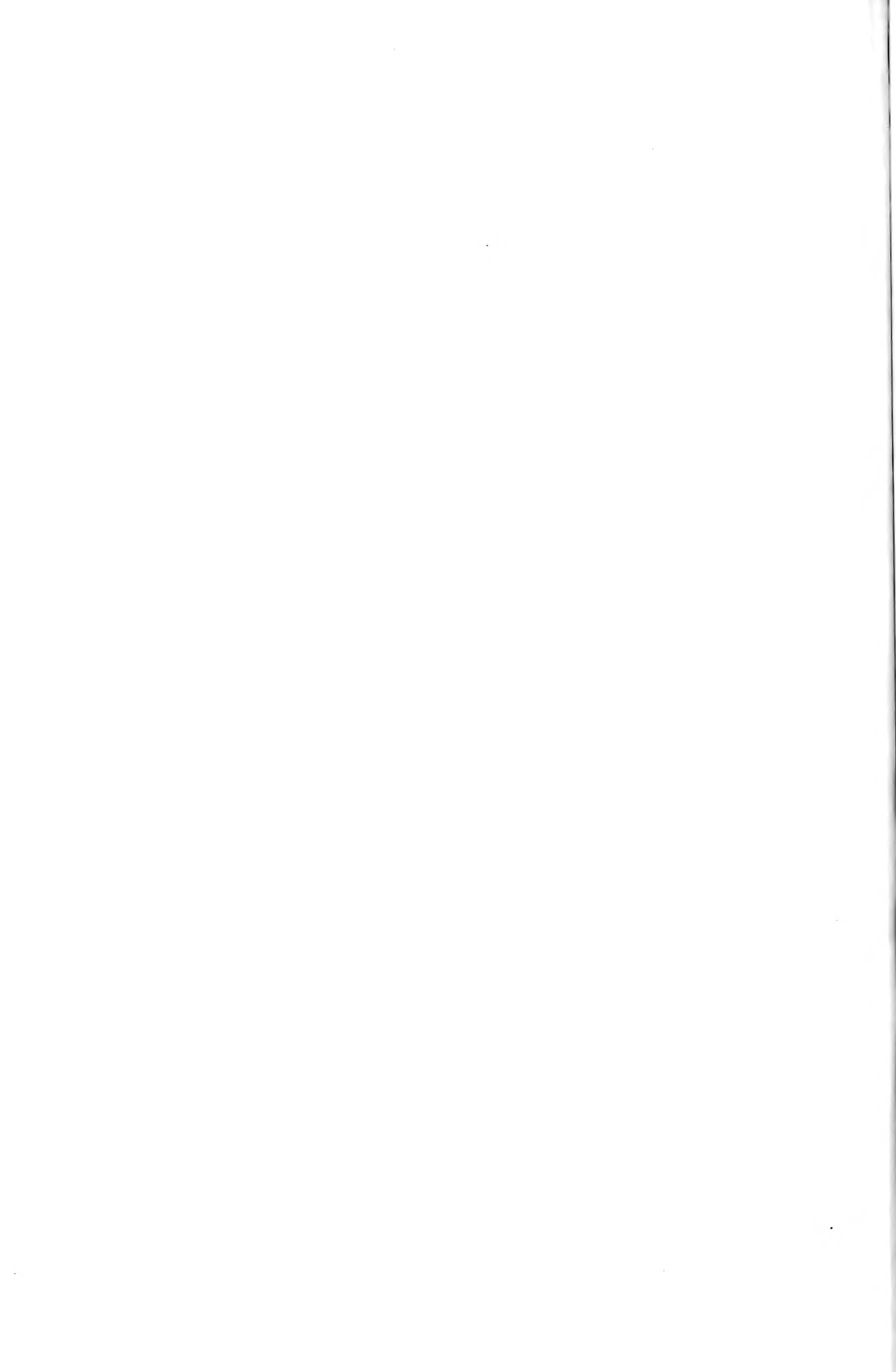
Rootstock, a slender bulb, growing in cultivation to as much as 1 in. in diameter, with creamy netted coats.

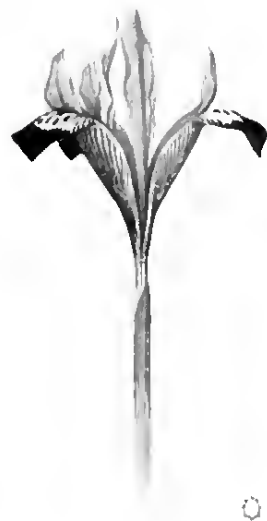
Leaves, 2, 3 or 4 to each bulb, quadrangular with four unequal sides (see the section on Plate XLV) and horny edges and tip, each leaf springing from two nearly colourless basal clasping sheaths. The longest is about 12 in. long at flowering time, the others being usually much shorter.

Stem, very short.

Spathe valves, narrow, clasping the tube, with a transparent edge, 3—6 in. long. When the flower opens the spathes reach to the top of the tube, but in a day or two the tube grows another inch and raises the flower by that much above the spathes.

¹ It is by no means certain that Bieberstein's plant was precisely the form that we commonly grow as the type. Either the colouring of the plate is inexact or his plant was a paler blue form.





*Pedice*l, short at first, but becoming two or three inches long after flowering.

Ovary, cylindrical, $\frac{1}{2}$ in. long.

Tube, 3—6 in. long, pale violet, with six deeper stripes.

Falls: *under surface*. The median portion is green, with black violet dots and dashes, the rest of the surface purple violet.

Upper surface, slightly panduriform, the haft ($1\frac{1}{2}$ in.) being deeply channelled, having along the centre a low yellow or rather orange ridge with black blotches. This is flanked on either side by a white region spotted with black violet, outside which the colour is purple with deep veins. The ovate blade ($\frac{1}{2}$ in. long by $\frac{3}{8}$ in. wide) is sharply deflexed, of a rich violet, with a raised orange ridge, bordered on either side by a white region, with broken violet veins and spots.

Standards, usually slightly longer ($2\frac{1}{2}$ in.) than the falls, narrow oblanceolate unguiculate, folded together laterally in the upper part, emarginate, poised at an angle of about 60° with the horizontal.

Styles, about $1\frac{1}{2}$ in. long, with nearly parallel sides, keeled, of a reddish purple colour.

Crests, large, triangular, with a coarsely serrate edge.

Stigma, deeply bilobed, with two rounded teeth.

Filaments, $\frac{3}{4}$ in. long, pale violet.

Anthers, $\frac{1}{2}$ in. long, pointed, bluish.

Pollen, yellow, the grains being of a pointed oval shape, with a depression running round the longer axis.

Capsule, cylindrical, $1\frac{1}{2}$ —2 in. long, with papery walls, 3 or 4 times as long as broad, pointed at either end, and raised above the surface of the ground by the elongated pedicel (cf. Fig. 30).

Seeds, when fresh, consist of two spheres separated by a slight constriction, one being white and the other pale pinkish brown. When fully ripe, the white end withers away almost entirely, leaving a brown seed with a smaller lighter appendage.

Observations.

See the introductory notes on the *reticulata* section.

††*I. HISTRIO*

(PLATE XLV, FIG. 2 and PLATE XLVI, FIGS. 2, 3 and 4)

Reichb. fl. BZ. 1872, p. 388.

Boiss. Fl. Or. v. p. 121 (1884).

Baker, Hdk. Irid. p. 42 (1892).

*Gard. Chron. 1892, II. p. 729.

1897, p. 105.

*Journ. Hort. Soc. XXVIII. figs. 116 and 117 (1904).

SYNONYMS.

**Xiphion histrio*, Bot. Mag. 6033 (1873).

I. reticulata var. *Histrio*, Foster, Bulb. Irises, 57 (1892).

Lynch, Book of the Iris, p. 165 (1904).

I. Libani, Reuter MS. ex Baker in Gard. Chron. 1876, I. p. 559 (K).

†Var. *atropurpurea*, see Observations. Plate XLVI, Fig. 3.

SYNONYM.

I. reticulata var. *atropurpurea*, Dykes in Gard. Chron. 1909, I. p. 113.

†Var. *orthopetala*, see Observations. Plate XLV, Fig. 2.

DISTRIBUTION.

Syria (Lebanon) and Asia Minor.

[N.B. It is difficult to distinguish with certainty *I. histrio* from its variety *orthopetala* and from *I. histrioides* in the dried state. Bornmüller's Amasia plant is, however, I believe, the original *I. histrioides* and the form now supplied under that name by Messrs Van Tubergen.]

Lebanon, 1855, Gaillardot (K).

1863, Gaillardot (K).

1873, Barbey (K).

Safita, 1866, Fox (K).

Marash, 1907, Gordon (HortD).

Adana, 1879, Danford (K).

Cilician Taurus, 1876, Danford (K).

Amasia, 1889, Bornmüller (K) (B).

Egin (Armenia), 1890, Sintenis (V) (B).

Erzeroum, 1853, Huet du Pavillon (K).

Diagnosis.

I. histrio Xiphion; *I. reticulatae* similis sed flos guttatus; *bulbus* bulbulos plurimos basi emittet; *folia* florem turbinatum superant.

Description.

Rootstock, a slender bulb, with netted coats, like that of *I. reticulata*, but producing a large number of offsets at the base.

Leaves, quadrate, with four unequal sides and horny corners and tip, the first to appear being 6—8 in. long at flowering time.

Stem, very short.

Spathe valves, pointed, colourless, transparent, with a few green veins.

Pedicel, none, or very short.

Ovary, cylindrical, $\frac{1}{2}$ in. long.

Tube, 3—4 in. long, colourless at the base, then becoming much spotted with reddish purple.

Falls, under surface, of a greyish or greenish white, with the blotches and veins showing through; the edge of the blade is usually blue.

Upper surface. The haft is separated from the ovate blade by a very slight constriction. The central yellowish ridge is not very prominent, and is marked with black tubercles at intervals. The haft is marked with branching blue veins, which towards the centre line become broken into dots. The edge and tip of the blade are deep blue, the central region being a creamy white marked with irregular scattered blue blotches, 2—2 $\frac{1}{2}$ in. long by $\frac{3}{4}$ in. wide.

Standards, divergent, very nearly as long as the falls with a long canaliculate haft and a small oblanceolate blade.

Styles, becoming distinctly wider in the upper part, so as to be almost triangular, about an inch long, blue, with a well-marked keel.

Crests, large, $\frac{3}{4}$ in. by $\frac{3}{8}$ in., lanceolate rather than deltoid, blue, with radiating, deeper veins.

Stigma, bilobed, with rounded outline.

Filaments, expanding at the base, white, spotted with purple.

Anthers, bluish, or white tinged with blue at the edges.

Pollen, bluish white, of the characteristic *reticulata* type.

Capsule, cylindrical, an inch or more in length, with thin, papery walls.

Seeds, of the characteristic *reticulata* type.

Observations.

Some of the difficulties encountered in trying to enumerate and locate the various varieties of this Iris have already been indicated in the introductory notes to the *Reticulata* Section (see p. 220). Another difficulty is that the original description of the species will fit equally well either of two forms which, owing to the persistence of some of their characters, it seems best to separate. These characters are the direction of the standards and the appearance of the spathes.

If we may take the figure of *I. histrio* in Gard. Chron. 1892, II. p. 729, and in Foster, Bulbous Irises, p. 8 (1892) as correct, then in *I. histrio* the standards are not held erect but incline outwards, and the narrow, greenish, tapering spathes only reach to some distance below the top of the tube (see Plate XLVI, Fig. 4). The closely allied form, in which the standards are erect and tend almost to fold inwards one over the other (see Plate XLV, Fig. 2), has longer spathes, in which the white ground between the green veins is much more prominent. At the same time I hardly feel justified in the present state of our knowledge in giving this form a specific name, nor have I been able to ascertain the locality from which it comes. Meanwhile the varietal name *orthopetala* will serve to distinguish it.

If it were not that the difference in the direction of the standards is always apparently accompanied by the difference in the spathes that has already been mentioned, I should be inclined to attach little importance to it, for I find that plants, which none would hesitate to call *Krelagei*, have no less than three forms of standard, incurved, erect and obliquely divergent.

The variety *atropurpurea* has apparently remained unknown except for the few bulbs that I received from Marash in 1908. The intense black sheen on the dark red ground is most striking, and the black processes that top the central ridge in typical *I. histrio* here become longer and more glistening, while the yellow central ridge is wholly absent. Even the anthers and the filaments are stained with the same black-red colour, but in shape and growth this curious plant differs in no way from *I. histrio*, of which it is a mere colour variety. Up to the present, I have been unable to obtain seeds to decide the interesting question as to whether or no it would breed true to the red-black colour.

†*I. HISTRIOIDES*

(PLATE XLVI, FIG. 1)

SYNONYM.

I. reticulata var. *histrioides*, Foster in *Bulbous Irises, pp. 9 and 59, figs. 7 and 37 (1892); *Garden, XLII. p. 364 (1892).

†Var. *sophenensis*¹.

¹ This was called after the classical name of the district near Kharput, from which bulbs were first sent to Foster by Mrs Barnum of the American Mission at that place.

SYNONYM.

I. reticulata var. *sophenensis*, Foster in Gard. Chron. 1885, 1. p. 470; *Bulbous Irises, pp. 7 and 58, fig. 35 (1892).

DISTRIBUTION. The neighbourhood of Amasia, whence it was sent to Foster by Miss Wright of the American Mission.

For specimens, see *I. histrio*, p. 223.

Diagnosis.

I. histrioides Xiphion; *I. histrioides* similis sed *folia* sub anthesin brevissima, *segmenta exteriora* patentia, *interiora* erecta.

Description and Observations.

I. histrioides is obviously closely allied to *I. histrio*, and is nearer to that species in its method of increase (see p. 220) than to *I. reticulata*. It differs from *I. histrio* by the fact that the bud appears almost, if not quite, as soon as the leaves pierce the soil, by the less turbinate flowers, of which the falls extend their haft horizontally, and also by the colouration. The main effect is blue of varying shades, but usually not so deep as some specimens of *I. histrio*. The solid colour at the edge of the blade forms, however, a much wider band in *I. histrioides*, so that only a relatively small triangular patch about the end of the narrow orange yellow crest is white, dotted with large or small blue spots. The standards are erect, of the same shade of blue as the falls.

The foliage is very stout and larger in diameter than that of any other member of the *Reticulata* section.

†*I. VARTANI*

Foster in Gard. Chron. 1885, 1. 438.

*Bot. Mag. t. 6942 (1887).

*Foster in Bulbous Irises, pp. 10 and 61 (1892).

*Temple, Fl. Palest. t. 14 (1907).

DISTRIBUTION. Palestine, perhaps only in the neighbourhood of Nazareth but I cannot separate from the type a specimen from Mt Tannar (Jerusalem), 1861, Roth (V).

Nazareth, 1884, Vartan (K).

[This specimen was sent by Ewbank in 1886, who obtained it through Foster from Dr Vartan of Nazareth, after whom the plant was named.]

Diagnosis.

I. Vartani Xiphion; *I. histrioides* proxima sed cristae stylis subaequilongae.

Description.

Rootstock, a bulb with netted coats, of a more pointed oval shape than those of *I. reticulata* and *I. histrio*.

Leaves, with four unequal sides and a colourless horny point, each bulb sending up two leaves of unequal length, of which the longer is 8—9 in. long at the flowering time, finally about 18 inches.

Stem, none or very short.

Spathe valves, $2\frac{1}{2}$ —3 in. long, white, thickly veined with green, narrow, not keeled.

Pedicel, very short at first, but afterwards growing and forcing the ripe capsule above the surface of the ground.

Ovary, cylindrical.

Tube, 2—3 in. long, slender, cylindrical, of a pale greenish yellow.

Falls, with a narrow cuneate haft and a lanceolate blade. The ground colour is white, closely covered with lavender or lilac veins, which become confluent near the margin. The median yellow ridge along the haft develops into a thin, low, yellow crest, which becomes wavy and almost tuberculate, and marked with blackish dots.

Standards. Blade narrowly lanceolate, with long canaliculate haft, of a dull slaty blue, with faint veins.

Styles, short, very convex, broader than the haft of the fall, of a slaty lavender colour.

Crests, longer than the styles and very narrow.

Stigma, bifid.

Filaments, white, expanding at the base.

Anthers, dark lavender, longer than the filaments.

Pollen, pale lavender, of the pointed double oval shape of that of *I. reticulata*.

Capsule, narrow, rounded trigonal, almost cylindrical.

Seeds, of the *reticulata* type.

Fragrance, very distinct, recalling that of almonds.

Observations.

This Iris is perhaps hardly worthy of specific rank, and should probably be considered as a subspecies of *I. histrio*.

It is the earliest to flower of all the *Reticulata* Irises, and for this reason, perhaps, is the most difficult to cultivate. When the flowers appear, as they often do, before Christmas, the foliage has already attained some length and suffers sadly in severe weather. The consequence is that sound bulbs do not develop for the following year; on the other hand, this early flowering habit makes it a desirable addition to our gardens, and it is all the more welcome for its strong almond fragrance.

A white and very floriferous form of this Iris has recently been introduced from Palestine. If grown in a pot in a cold frame, flowers are easily obtained even before Christmas. One specimen has appeared among those that I have grown with the blade of the fall dotted with bright blue, giving the flower an appearance not unlike that of the *albopurpurea* variety of *I. laciniata* (see Plate XVIII).

†*I. DANFORDIAE*

Boiss. Fl. Orient. v. (1884), p. 124.

[The plant was first described by Baker as *Xiphion Danfordiae* in Journ. of Botany, v. 1876, p. 265, from imperfect specimens, sent to Kew by Mrs Danford, who gathered them in 1876 on the north side of Mt Anascha, a continuation of the Ala Dagh in the Cilician Taurus (K).]

*Bot. Mag. t. 7140 (1890).

*Gartenflora, XXXIX. 1890, t. 1327.

*The Garden, 1890, p. 462, t. 753.

*Gard. Chron. XXVII. 1900, p. 170.

*Journ. Hort. Soc. XXVIII. t. 123 (1904).

SYNONYMS.

I. Bornmulleri, Haussknecht in Flora, 1889, p. 140.

Gard. Chron. 1890, t. p. 293, t. 49 b.

Oest. Bot. Zeitsch. XLIV. 1894, p. 326.

I. amasiana, Bornmuller in Flora, 1889, p. 140, in synonymy.

I. crociformis, Freyn in Oest. Bot. Zeitsch. XLIV. 1894, p. 326.

DISTRIBUTION. Eastern Asia Minor.

Cilician Taurus, 1876, Mrs Danford (K).

Amasia, 1889, Bornmuller. no. 2 (K) (BM) (B).

Sipikor Dagh, 1889, Sintenis, no. 117. (The plate in the Bot. Mag. was prepared from plants grown from bulbs obtained from this source through Max Leichtlin (K) (B).)

Cilicia, 1896, Siehe, no. 681 (K) (BM) (B).

Diagnosis.

I. Danfordiae *Xiphion*; *I. histrioides* affinis sed *segmenta* interiora minutissima, setosa; *flores* lutei.

Description.

Rootstock, a slender, ovate bulb, with whitish netted coats.

Leaves, about 2 to each bulb, very short at flowering time, eventually 9—12 in. long, 4-sided, bluish green, with a white, horny point.

Stem, very short, 1-headed.

Spathe valves, 1-flowered, pointed, clasping the tube, not inflated, pale green, by reason of the green veining on a nearly colourless ground.

Pedicel, $\frac{1}{4}$ in. at flowering time, eventually becoming 1—2 in. long.

Ovary, $\frac{1}{4}$ in. long, cylindrical.

Tube, $1\frac{1}{2}$ —3 in. long, yellow, with 6 shallow grooves.

Falls. The narrow haft expands somewhat suddenly into the ovate-lanceolate blade. The haft is veined and dotted with olive green, and similar markings usually occur on the blade round the end of the conspicuous orange median ridge; this ridge is continued along the haft, where it bears scattered spots of green and a number of microscopic hair-like processes, each with as many as 6—9 swollen nodes.

Standards, minute, erect, yellow spines, less than $\frac{1}{4}$ in. long, often lying close along the falls or styles, and difficult to distinguish.

Styles, short, not much more than half an inch long, triangular, usually, but not always, blotched with green or olive brown.

Crests, comparatively large, quadrate, with a serrated outer edge.

Stigma, bilobed.

Filaments, nearly equal in length to the anthers, whitish.

Anthers, cream coloured.

Pollen, pale cream coloured, of the characteristic *reticulata* shape, the two segments being equal in size, and of a much rounded oval outline.

Capsule, $\frac{1}{2}$ — $1\frac{1}{4}$ in. long, broad below and tapering to a point above, rounded trigonal, with thin papery walls that bulge outwards (cf. Fig. 30).

Seeds, of the *reticulata* type, comparatively large, equalling those of *I. reticulata*.

Fragrance, not noticeable.



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VAL. 57





Observations.

Considerable confusion arose with regard to this Iris, owing to the fact that Baker's original description was founded on imperfect dried material. The bulbs had lost their outer reticulated coats and the inner skin appeared to be merely membranous, thus resembling the bulb of a small *Juno* Iris, such as *I. persica*, but in reality agreeing with those of the other members of the *Reticulata* group, in which the inner skin is much less distinctly veined than are the outer coats. This fact and the minuteness of the standards led Baker to class it at first by itself, and afterwards (Handb. Irid. p. 44) in the *Juno* group. Accordingly, when some years later Bornmüller discovered more specimens near Amasia and Egin, Haussknecht founded on them a new species, *Bornmülleri*, which differed from Baker's description in having reticulate and not membranous coats. However, Foster was able to obtain through Max Leichtlin some of the bulbs collected by Bornmüller, and to compare with them when they flowered a dried specimen supplied by Mrs Danford herself. He then had no doubt as to the identity of the two plants (Foster, *Bulbous Ir.* p. 12, 1892).

This species is one of the smallest, but especially valuable for its bright colour and early flowering habit. It is usually in flower in January and February, and increases rapidly by offsets. Six or eight of these or even more form at the base of each bulb of flowering size, and it is obvious that the struggle for existence among them will be so keen that some will succumb, unless they are given space in which to find nutriment and room to develop. It is therefore best to lift the bulbs every year, and to replant them two or three inches apart. This operation should be carried out soon after the leaves have withered, and if the bulbs have to be kept out of the ground for any length of time, they should be covered with dry sand to prevent shrivelling. In any case they should be replanted early in the autumn.

The soil that suits them best seems to be a rather heavy loam, well enriched with humus, provided that the position is well-drained and sunny and dry in summer.

No hybrid of this Iris is known.

†*I. BAKERIANA*

(PLATE XLV, FIG. 3)

*Foster in Bot. Mag. t. 7084 (1889), named after Mr J. G. Baker, at that time Keeper of the Kew Herbarium.

*The Garden, 1890, p. 462, t. 753.

*Gard. Chron. 1890, II. p. 293, t. 45 a.

Baker, Handb. Ir. p. 42 (1892).

*Gard. Chron. 1897, XXI. p. 103.

*Journ. Hort. Soc. XXVIII. t. 120 (1904).

*Gard. Chron. 1909, XLV. p. 53.

DISTRIBUTION. Asia Minor and Mesopotamia. The type, which is in Herb. Kew., was cultivated by Foster from bulbs sent to him in 1887 by the Rev. G. F. Gates of the American Mission and collected in the neighbourhood of Mardin in Armenia.

Other specimens.

Kurdistan (Kangiwar), 1877, Floyer (K).

On hills near the Euphrates, 1879, Mrs Danford (K).

Kurdistan, 1888, Sintenis (K).

Sultanabad (Prov. Irak-adschmi, Mt Schuturunkuh), 1897, Strauss (B).

Diagnosis.

I. Bakeriana Xiphion; *I. reticulatae* affinis sed *folia* cylindrata 8-costata nec tetragona.

Description.

Rootstock, an ovate bulb with greyish-white, netted coats as in *I. reticulata* but somewhat more slender.

Leaves, usually two from each bulb, 4—6 inches long at flowering time and finally a foot or more in length, hollow, cylindrical, with 8 ribs, of a glaucous bluish green, with a white horny tip as in *I. reticulata*.

Stem, very short if any.

Spathe valves, narrowly lanceolate, membranous, greenish by reason of the conspicuous green veins on a whitish ground.

Pedicel, very short at first, but afterwards growing and bringing the ripe capsule to the surface.

Ovary, cylindrical.

Tube, 3—6 in. long, rising 1—1½ in. above the spathes, with 8 deep violet lines in the upper part.

Falls. The oblong-elliptical haft is separated by a slight constriction from the small, sharply reflexed ovate blade. The latter is of an intense violet at the tip and round the circumference, the central space being white with small deep violet spots. Along the upper part of the haft runs an inconspicuous pale yellow streak, hardly raised into a ridge and becoming white on the blade. The sides of the haft bear oblique parallel lilac veins on a pale whitish ground, which is dotted with violet down the centre.

Standards, erect, oblanceolate, of a uniform deep lilac colour.

Styles, slightly narrower than, and as long as, the haft of the falls, keeled, of a bluish purple colour.

Crests, large, almost quadrate with a finely serrated outer edge.

Stigma, bilobed.

Filaments, pale violet, rather longer than the anthers.

Anthers, blue with deep violet edges.

Pollen, golden yellow, of the characteristic *reticulata* shape, one segment of the extine being, however, noticeably smaller than the other.

Capsule, rounded trigonal, tapering at either end, with creamy white, papery walls, about an inch long.

Seeds, of the *reticulata* type but somewhat small.

Fragrance. Some flowers are strongly violet-scented, others much less; or it may be that warmth is required to bring out the fragrance.

Observations.

This beautiful little species is interesting as being separated by one distinct feature from all the other members of the *reticulata* group, namely by the structure of the leaves, which are octagonal in section. Its habit of growth, its flowers, pollen, seeds and netted bulb closely resemble those of *I. reticulata* but its eight-ribbed leaves are unlike those of any other known species.

Among seedlings of this Iris slight variations in colouring are found, in the arrangement that is of the violet markings on the white ground, not in the actual shade of colour. Moreover, similar, though slight, variations are found in offsets from the same bulb, an undoubted instance of variation in plants produced by vegetative, as opposed to sexual, increase.

I. Bakeriana is perfectly hardy but, as it usually flowers during the most inclement weather of the year, in January and February, it is worthy of a sheltered position. If it can be given the protection of a temporary glass roof, when in bloom, the flowers will last a fortnight and defy many degrees of frost. Bulbs that are doing well may be left undisturbed for two or three years, for this species is not one of those that form a large number of small offsets round the base of the large bulb. A bulb that has flowered usually splits into two or three, one or two of which will flower in the following season.

For further notes on soil and cultivation, see the introduction to the *Reticulata* Section.

Hybrids. No certain hybrids of this species appear to be known but a few years ago the late Max Leichtlin sent me a bulb with the name of *I. Bakeriana* var. *mcclainii*, with a note to the effect that he had raised it from seed. It closely resembles the type, except that the spathes rise to the top of the tube, and that the deep violet edging covers a larger portion of the blade of the falls. There is however one marked difference, namely in the leaves, which suggests the possibility that the plant is a hybrid of *I. Bakeriana* crossed with pollen of *I. reticulata*. The leaves instead of being octagonal, as in the type, have six ribs, set at irregular intervals as in *I. reticulata*.

I. KOLPAKOWSKIANA

Regel, Act. Hort. Petrop. v. 263 (1877). (Named after General Kolpakowsky, a governor of Turkestan.)

*Regel, Gartenfl. 1878, pp. 40 and 161, t. 939.

*The Garden, 1888, p. 559, t. 653, fig. 4.

Baker, Hdk. Irid. p. 43 (1892).

Foster in Bulb. Irises, p. 63 (1892).

SYNONYMS.

Xiphion Kolpakowskianum *Baker in Bot. Mag. 6489 (1880) from specimens grown by Burbidge at Trinity College, Dublin, from bulbs received from Turkestan. MS. (K).

Maxim. in Bull. Acad. Pét. XXVI (1880), 504.

DISTRIBUTION. The neighbourhood of Werny and the Ili River in Turkestan.

Little Almatinka, 1877, Regel (B).

Werny, 1877, Regel (K) (V) (B).

Karassu (Ili district), 1886, Krassnow (K) (P) (B).

Komissarovsk (10 miles N. of Werny), 1907, Sokalsky (E).

Kou-jouk, 1895, Chaffanjou (no. 550 bis) (P).

Diagnosis.

I. Kolpakowskiana Xiphion; *I. reticulatae* haud dissimilis sed *vagina* caulina basali unica in tubum connata, folia radicalia scapumque florentem fovente (neque pluribus haud connatis foliis radicalibus seorsim a vaginis propriis circumdatis) valde differt; *folia* complicata nec tetragona.

Description.

Rootstock, an ovate bulb, covered with a network of fibres, similar to those of *I. reticulata*, but if anything coarser.

Leaves, 3—4 are produced from each bulb, all enclosed in one membranous sheath, 2 in. long at flowering time, channelled with thick edges, linear, resembling those of some Crocuses.

Stem, not produced.

Spathe valves, distinctly green, acuminate.

Pedicel, $\frac{1}{2}$ in.

Ovary, $\frac{1}{2}$ in.

Tube, 2—3 in.

Falls: under surface, greenish yellow with purple shining through.

Upper surface. The lanceolate blade is tipped with fine red purple with a few darker veins. Below this purple region the ground is of a creamy white colour on either side of the low yellow crest. On the haft the crest diverges into two yellow bands, which become greenish at the base and the ground is marked with dotted purplish veins.

Standards, concolour, oblong, of a very light purple.

Styles, concolour, very light purple.

Crests, narrow, pointed.

Stigma, entire.

Filaments,

Anthers,

Pollen, white.

Observations.

This species is no longer apparently in cultivation in England and from the fact that it has more than once died out it would seem to be somewhat difficult to manage. Its Crocus-like foliage at once distinguishes it from all other Irises but its position in the Genus is uncertain.

I. WINKLERI

Regel in Act. Hort. Petrop. VIII. 1884, 677.

[Named by Regel after a colleague.]

DISTRIBUTION. It has apparently only been found once at an altitude of 9—11,000 feet in Turkestan between the Urgent and the Alabuga, tributaries of the River Naryn.

Description.

This plant is not apparently in cultivation and only the original description can be given. It was said by Regel to be near *I. Kolpakowskiana* which may be readily distinguished "bulbi tunicis reticulato-fibrosis, foliis multinervis sub lente ad nervos denticulato-scabris."

Regel's description is as follows:—*Bulbi* ovati tunicae membranaceae (nec fibroso-reticulatae). *Caulis* nullus. *Scapus* uniflorus, brevissimus; vagina basilaris solitaria aphylla, scapum foliorumque basin includens. *Folia* radicalia 4, anguste linearia, a medio recurvato-patentia, 3-nervia, glabra, subtus nervo medio prominente carinata, florem aequantia vel superantia.

Observations.

Regel distinguishes this plant from *I. Kolpakowskiana* by the membranous coats of the bulbs (though it is just possible that he had only dried specimens from which the wrapping fibres had fallen away from the bulb). The tube is equal in length to the purple flower. The standards are erect and both narrower and a little shorter than the falls.

THE GYNANDRIRIS¹ SECTION

This section contains but one species, *I. sisyrinchium*, unless indeed we give separate names to the dwarf one-leaved forms, which seem to occur in many localities alongside the typical form.

I. sisyrinchium is distinct from all other Irises in the possession of a corm as opposed to a bulb, although in its netted coats it makes an approach to the species of the *Reticulata* Section.

†‡ *I. SISYRINCHIUM*

Linn. Sp. Pl. ed. 1. p. 40 (1753).

*Red. Lil. t. 29 (1802) and t. 458 (1816).

*Sibth and Smith, Fl. Graec. t. 42, vol. 1. p. 30 (1806).

Boiss. Fl. Or. v. p. 120 (1884).

Baker, Hdk. Irid. p. 43 (1892).

Foster, Bulbous Irises, p. 1 (1892).

Richter, Pl. Eur. 1. p. 259.

Asch. und Graeb. Syn. Mit. Fl. III. p. 516 (1906).

¹ The name Gynandiris appears to have been first used in connection with this Iris by Parlatores, Nuov. gen. e spec. p. 49 (1854).

SYNONYMS. Of this, the most widely distributed of all *Iris*s, there are innumerable forms, but there is little doubt that sufficient allowance has not been made by those who have given new specific names to local forms for the influence of soil and environment. The comparison of several hundred herbarium specimens has shown that the smallest and the largest forms often grow in the same neighbourhood. As instances, we may take Schweinfurth's (K) specimens from the Egyptian Delta, one of the strongest growing forms, and Hurst's minute examples (K) from Alexandria, Lemann's (C) (BM) specimens from Gibraltar or Ruhmer's from Benghazi in Cyrenaica (B), some of which have one leaf and some two. With such instances before us it is difficult to attach much value to such specific names as Heldreich's *I. monophylla*. It is curious also to notice that Unger's (V) specimens from the Pyramids in Egypt are only half the size of Kotschy's (V) specimens from the same locality.

The following varieties have been named but they appear to have little value.

- Var. *minor*, Cambess. Enum. Balear. p. 142 (1827).
 Var. *monophylla*, Heldr. Atti Congr. Firenze, 1874, p. 234 (1876).
 Richter, Pl. Eur. I. 259 (1890).
 Var. *fugax*, Richter, Pl. Eur. I. 259 (1890).
Moraea sisyrinchium, Ker-Gawl. in König und Sims, Ann. I. p. 241 (1805).
 *Bot. Mag. t. 1407 (1811).
 Baker in J. L. S. XVI. (1877), p. 132 (and vars. *minor* and *fugax*).
Moraea fugax, Ten. Syll. p. 26 (1831).
Moraea Tenoreana, Sweet, Brit. Fl. G. v. 110 (1825).
Gynandiris sisyrinchium, Parl. Nuov. Gen. e Spec. p. 49 (1854).
 Fl. It. III. p. 309 (1858).
 Gren. et Godr. Fl. Fr. III. p. 246 (1855-56).
 Klatt in Linnaea, XXXIV. p. 577 (1866).
Gynandiris monophylla, Klatt in Linnaea, XXXIV. p. 578 (1866).
 Nyman, Consp. p. 703 (1878-82).
Xiphion sisyrinchium, Baker in Journ. Bot. IX. (1871), p. 42.
 *Bot. Mag. t. 6096 (1874).
Diaphane edulis, Salisb. Trans. Hort. Soc. I. p. 304 (1812).
Iris maricoides, Regel in Act. Hort. Petrop. VIII. p. 678 (1884).
Iris maculata, Tod. et Lojac. in Lojac., Fl. Sic. III. p. 73 (1909).
Iris fugax, Ten. Fl. Nap. I. p. 15 (1811-15).
Iris collina, Salisb. Prod. p. 45 (1796).
Iris zelantea, Vigo ex Parlat. Nuov. Gen. e Spec. p. 53 (1854).
 [*Iris involuta*, Garzia, Effem. sc. lett. Sic. XXXIV. 286 (1834).]
Iris samaritanii, Heldr. in Atti Cong. Bot. Firenze, 1874, p. 234 (1876).
Iris aegyptica, Delile in Laborde, Voy. Arab. Petr. p. 82 (1833).
Iris syrtica, Viviani, Fl. Lyb. Spec. 3, t. 1, f. 1 (1824).

DISTRIBUTION. From Portugal and Morocco to North-West India.

- Portugal*. Lisbon, 1828, Holl (V).
 1838, Hochot (V).
 1846, Trevelyan (K) (E) (C).
 1848-50, Welwitsch (C).
 Collares, 1879, Ball (E).
 Elvas, 1886, Senna (B).
 Estremadura, 1848, Welwitsch (BM) (C) (V).
 Monsanto, 1877, Daveau (C).
 Serra da Arrabida, 1880, Müller (K).
 Serra de Gerez—Willkomm (K) (B), 1849, Willdenow (V).
Spain. Almeria, 1890, Porta et Rigo (E) (BM).
 Algeciras, 1887, Reverchon (E).
 Murcia, 1852, Bourgeau (K) (E).
 Gibraltar, 1841, Lemann (C) (BM).
 Cordova, 1851-2, Lange (C).
 Malaga, 1837, Hb. Boissier (B), 1871, Cander (B), 1904, Gandoger (B).
 Cadiz (Aguada Puntaler), 1873, Winkler (B).
Morocco. No locality, 1871, Hooker (K), 1872, Rein und Fritsch (K) (B), 1876, Cosson (K).
 Tangier to Tetuan, 1871, Ball (B).
 Tomara Forest to Shellah (Rabat), 1887, Abdul Grant (B).
 Djebel Hadid (Mogador), 1871, Ball (B).
 Shedma, 1871, Ball (B).
 Tazeroualt, 1876, Cosson (B).
 Asserarid, 1875, Beaumier (B).
Algeria. Algiers, 1852, Müller (B), 1837, Bové (K) (B).
 1850, Jamin (K) (V).
 Maison Carrée, 1867, Paris (BM) (B).
 Setif (Constantine), 18—, Dukerley (B).
 El Kantara (Constantine), 1889, Engler (B).
 Hussein-Dey, 1879, Gandoger (BM) (V) (B).

- Blidah, 186—, Lefebvre (V).
 Oran, 1850, Durando (V), 1881, Debeaux (B).
 El Aghouat, 1866, Paris (B), An-Sefra, 1910, Diels (at 3240 ft) (B).
Tripoli. Gergarasch (10 miles from Tripoli), 1880, Krause (B).
 Tripoli neighbourhood, 1881, Krause (B).
 Benghazi (Cyrenaica), 1883, Ruhmer (B), 1884, Petrovich (B).
 Derna (Cyrenaica), 1887, Taubert, no. 252 (B).
Tunis. Marsa, 1889, Engler (B).
 Gafsa, 1908, Pitard (B).
Majorca. 1827, Cambessides (K) (B).
Corsica. Bonifacio, 1880, Reverchon (V) (B).
 1849, Kralik (V).
 1866, Mabile (BM) (K) (V).
Sardinia. 1834, Bonjean (K).
 1835, Thomas (BM) (V).
 Iglesias, 1884, Forsyth (B).
 Tempio, 1882, Reverchon (B).
 Cagliari, 18—, Hb. Ascherson (B), 185—, H. du Pavillon (V).
Italy. Genoa, Porta degli Angeli, 1892, Penzig (C), 1867, Venturi (B).
 Apulia (Manfredonia), 1875, Porta et Rigo (C) (BM) (V) (B).
 Manfredonia, 1812, Sieber (V).
 Naples, 1844, Funk (V).
 Capri, —, Tenore (E).
 Tarentum, 1878, — (K).
 Reggio, 1844, Lerescha (V).
 Gallipoli, 1883, Groves (E), 1880 (BM).
 Calabria, 1843, Thomas (B).
 I. Favignana, 1855, Huet du Pavillon (K).
Sicily. Taormina, 1899, Busse (B).
 Messina, 1847 (K).
 Etna, 1863, Hagedorn (B).
 Catania, 1843, Kamphovener (B).
 Syracuse, 1840, Hb. Heldreich (B), 1898, Rigo (V).
 Palermo, 18—, Schweizzer (B), 1906, Ross (E).
Malta. 1872, Schweinfurth (B), Duthie (E).
Crete. Kanea, 1841, Sieber (K) (V) (B).
 Kanea, 1883, Reverchon (E) (V) (B), 1884, Reverchon (K) (B), 1901, Reverchon (B).
 Kissamos, 1884, Reverchon (E) (B).
Greece. Megara, 1862, J. S. Mill (K).
 Navarino, 1862, J. S. Mill (K).
 Phalerum, 1856, J. S. Mill (K), Heldreich (B) (V).
 Attica passim, Heldreich (B) (K) (BM) (V).
 Egina, 1847, Lefevre (B).
 1881, Heldreich und Holzmann (B).
 Cephalonia, 1867, Schmidt (B).
 Melos, 1889, Heldreich (B) (BM) (E).
 —, Sibthorpe (V).
 Petalioi (Euboea), 1881, Holzmann (B).
 Syros, 1871, Orphanides (B).
 Corfu, 1842, Trevelyan (E).
 Leucas, 1894, Bryoni (B).
 Cos, 1911, Shearme (HortD).
Asia Minor. Smyrna, 1827, Fleischer (K) (V).
 1883, Pichler (K) (B).
 Cilicia (Pompejopolis), 1896, Siehe (E) (BM) (O) (B).
 Troas, 1879, Virchow (B).
 Troy (Kenkrei), 1883, Sintenis (BM) (B) (E), 1856, Rich (E).
 1864, Schmidt (B).
 Pamphylia (Adalia), 1845, Hb. Heldreich (BM) (B).
Cyprus. 1862, Kotschy (V).
 1880, Sintenis (K) (B).
 1901, Lascelles (K).
 1904, Samson (K).
 Limasol, 1859, Kotschy, no. 424 (B).
Egypt. Abu Sabel (E. edge of Delta), Schweinfurth (K) (V).
 Ramleh, 1868, Schneider (B).
 Alexandria, 1871, Hurst (K) (BM), 1857, Samaritani (V).
 1833, Hussenot (K).
 1834, Martius (K).
 1857, Samaritani (B).
 Fayum, 1879, Schweinfurth (K) (V).
 Pyramids, 1855, Kotschy, no. 595 (V) (B).
 1888, Unger (V).

- Gizeh, 1831, Hb. Monbret (V).
 1848, Kralik (V).
 —, Ehrenburg (B).
- Syria.* Aleppo, 1865, Haussknecht (K) (V) (BM) (B).
 1841, Kotschy (V).
 Beirut, 1850, Blanche (V), 1875, Post (BM).
 Lebanon and Beyrout, 1851, De Lessert (B).
 Lebanon, 1857, Gaillardot (K).
 E. of Jordan, 1873, Paine (K).
 Tiberias, 1897, Mars (B).
 Plains of Esdraelon, 1851, De Lessert (B).
 Jerusalem, 1861, Hb. Reg. Monac. (V).
 1889, Jouannet-Marie (V).
 Nazareth, 1863-4, Lowne (BM) (C).
 Hebron, 1855, Kotschy (V).
 Hauran, 1882, Stubel (B).
- Mesopotamia.* Euphrates (Bamboudseh), 1836, Chesney (BM) (V) (C) (K) (B).
 Mosul (Nineveh), Kouyanjik, 1849, Loftus (BM).
 Biredjik, 1888, Sintenis, no. 177 (B).
- Arabia.* Koweit, 1865, Pelly (K).
- Persia.* Kirman (Chabis), 1859, Bunge (V) (B).
 Kischm, 1893, Bornmüller (B).
- Turkestan.* Askabad, 1900, Sintenis (BM) (V) (K) (B).
- Bokhara,* Kulab, 18—, Regel (K).
- Baluchistan.* 1851, Stocks (K) (C) (V) (B).
 Shorawak Plain (Nushki), 1896, Maynard (BM) (K) (B).
 Quetta, 1910, Cave Brown (HortD), 1911, Keyes (HortD).
 1888, Duthie (BM).
- Afghanistan.* 1862, Griffith (K) (V) (B), 1885, Aitchison (K).
- North-West Frontier Province.* Peshawar, 1877, Aitchison (K).
 Kuram Valley, 1879, Aitchison (K).

Diagnosis.

I. sisyrinchium cormum profert tunicis reticulatis vestitum nec bulbum nec rhizoma; *spathae* basi tubulatae.

Description.

Rootstock, a small globose corm, usually loosely wrapped in several layers of coarsely reticulated coats, the remnants of the corms of former seasons. The corms are said to be edible but my experience is that they are exceedingly bitter and unpleasant to the palate.

Leaves, few in number, small bulbs often only producing one leaf, linear, complicate, strongly veined, often falcate. 3—15 in. long.

Stem, 1—12 in. long, often bearing several lateral heads in addition to the terminal cluster of flowers.

Spathe valves, papery, brownish green, closely ribbed, scarious at the edge and tip. The outer valve (about $1\frac{1}{2}$ in.) is shorter than the inner valves but all are usually tubular for some distance above the base. 1—6 flowered.

*Pedice*l, $\frac{1}{4}$ in. flattened.

Ovary. There is no obvious constriction between the ovary and the tube, which together measure $1\frac{1}{4}$ in., so that it is difficult to say where one ends and the other begins.

Tube. The tube is spotted with red purple in the upper part.

Falls, of various shapes, varying from lanceolate to obovate with a short tapering haft. There is always on the blade a more or less conspicuous white patch, often spotted with the prevailing colour and surrounding the end of the yellow ridge, which, on the haft, is sometimes dotted with black. The main colour of the falls is of some shade of blue purple, rarely of a reddish tone of purple.

Standards, oblanceolate, slightly shorter than the falls, with a canaliculate haft, of which the concave side is turned outwards. This character is probably peculiar to this *Iris*.

Styles, short, adnate to one another for some distance.

Crests, comparatively large, subquadrate.

Stigma, with two distinct rounded tongues.

Filaments, bluish or violet, longer than the anthers, adnate to, but not connate with, the styles.

Anthers, bluish or pale violet.

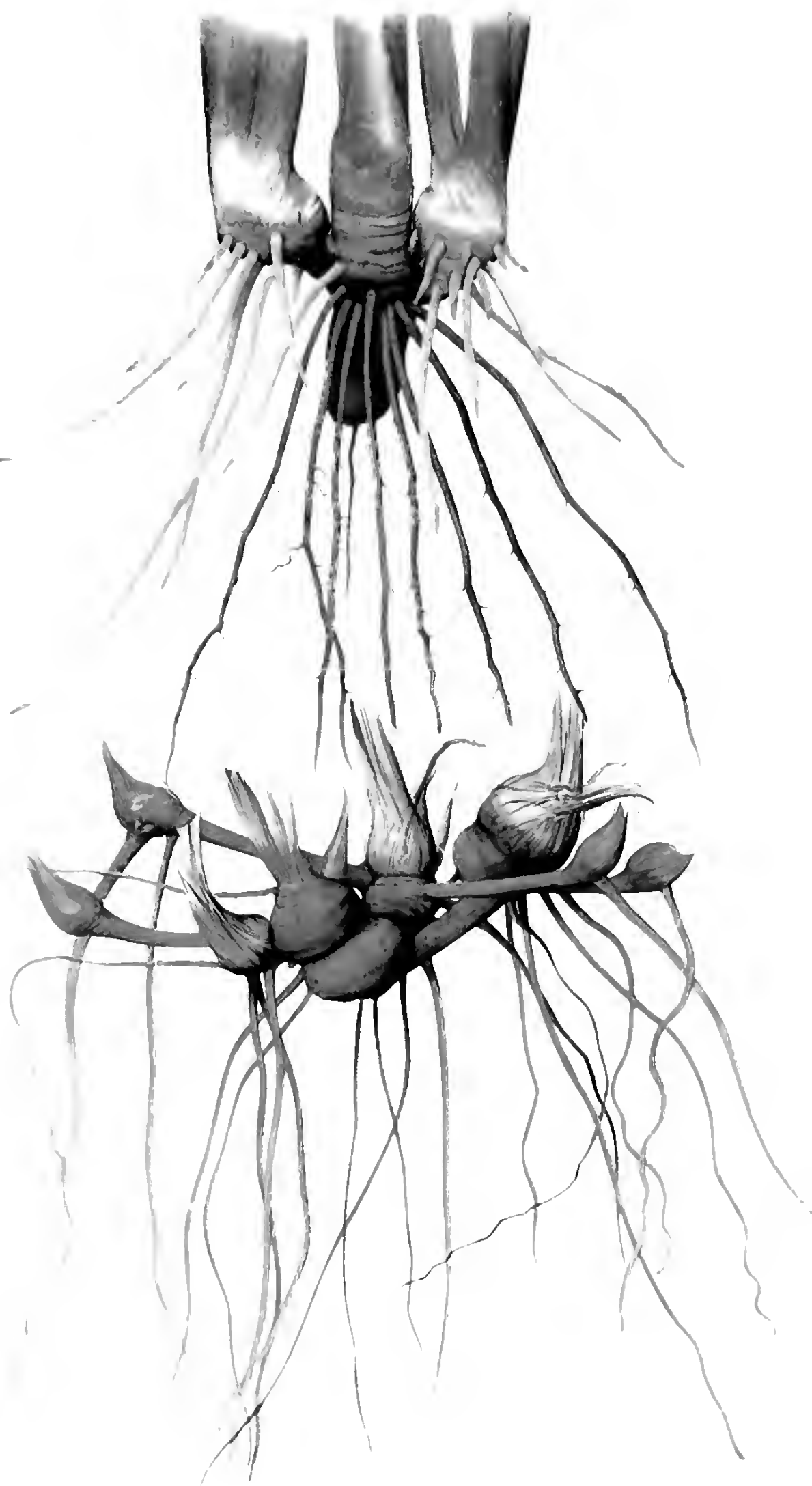
Pollen, cream.

Capsule, narrow, oblong, trigonal, 1— $1\frac{1}{2}$ in. long, with thin papery walls.

Seeds, small, dark brown, globose or slightly flattened.

Observations.

I. sisyrinchium is the most widely distributed of all *Irises* and was thought by Foster to represent an approach to the archetype of the genus.



XIV

Rhizomes of a Pogonins and of a Regelii Ir

In its corm and in its single-valved spathes it is more like a *Moraea* than an *Iris* but since its segments coalesce to form a tube for a short distance above the ovary, it is considered as an *Iris*.

Each stem usually produces several heads of flowers and each spathe contains a number of buds. These open in succession and though the individual flowers only last from about 11 or 12 in the morning until 5 or 6 p.m., yet a constant succession of them prolongs the flowering period over a fortnight or more.

The plants succeed best in a heavy limestone soil in a hot and dry position. It is best to lift them yearly when the foliage withers and store the corms in sand until September. If they are left in the ground, the corms sometimes fail to ripen, or growth may begin too early, in which case the foliage suffers during the winter.

IRIS HYBRIDS

It is impossible to give an account of all the hybrid *Irises* that have been raised, and these notes will therefore only endeavour to indicate the main lines upon which hybridisation has proceeded, and to make suggestions as to the origin of those plants which have long been in cultivation in our gardens but whose origin is unknown. Several have been described as species, and have been long regarded as such, but the absence in the chief herbarium collections of any indication of their existence in uncultivated areas points to their hybrid origin.

The *Iris* genus is subdivided into sections by certain morphological characters (see p. 13), and the fact that hybrids between the various sections are both extremely rare and have been hitherto invariably sterile, seems to show that these characters indicate very real differences in the nature of the plants.

For instance, no hybrid between a bulbous and a non-bulbous *Iris* has yet been recorded, notwithstanding the fact that it was once declared that *I. Kaempferi* and *I. xiphioides* had been combined to produce Deleuil's *I. hyerensis*. I have seen the so-called *I. hyerensis* growing in Deleuil's garden at Hyères, and have no doubt that it is merely a form of *I. spuria*. When it is remembered that the latter as well as *I. xiphioides* and *I. Kaempferi* produces abundance of seed and is almost certainly self-fertile, it is easy to see how a supposed cross may have been produced in a garden where all three *Irises* were growing. Moreover, not only has no bulbous *Iris* been combined with a non-bulbous species, but also it has not been found possible to raise hybrids between the members of the various groups that compose the bulbous section. A *xiphium* will not readily cross with a *reticulata*, nor a *Juno* with either, and it is even possible to go further and say that the members of the various subdivisions of the *Juno* group are sterile to each other's pollen (see p. 188).

On the other hand, with the exception of *I. xiphioides* all the members of the *xiphium* group seem capable of combination, and the same is probably true of the *reticulata* species, even though no hybrid of *I. Danfordiae* has yet been made.

In dealing with the non-bulbous *Irises*, it will be found that not only do the *Apogon* *Irises* form a section which is far more widely separated from the other sections, such as the *Evansias*, the *Oncocyclus* species, and the *Pogoniris*, than are the latter from one another, but also that the various species of *Apogon* *Irises* are in many cases as widely separated from one another as are the various sections which form the rest of the genus. This, at any rate, is the conclusion to which we are led by a review of the facts, which show that, although hybrids between *Oncocyclus* and *Regelia* and *Pogoniris* species are relatively common, and those between *Pogoniris* and *Evansia* not unknown (see p. 98 and Plate XXIV), yet interspecific hybrids of the *Apogon* section are extremely rare.

A few instances are recorded, as for example the Japanese hybrids of *I. Kaempferi*, in the production of which it is possible that *I. setosa* may originally have been used, although the only trace it would appear to have left lies in the development of the falls at the expense of the standards. Other instances were the combination of *I. fulva* and *I. foliosa*, which are however both members of the closely allied *hexagona* group, and of *I. Clarkei* and *I. Douglasiana*, which may perhaps be taken as an indication that such hybrids are after all far from impossible.

On the other hand, repeated attempts to fertilise such species as *I. pseudacorus* and *I. foetidissima* have always remained fruitless, and Foster's answer to the question whether he had ever succeeded in combining an *Apogon* and a *Pogoniris* was to show me a large clump of what looked like *I. germanica*, and to tell me that it arose from a single seed obtained by pollinating that species with pollen of *I. spuria*. He added, however, that the only fact that made him think that "anything had happened" was that the plant had never flowered, though it had grown vigorously, and although no other *Pogoniris* had remained flowerless for so long when in such good health in the Shelford garden.

Foster's notebooks show that he found it possible to combine many of the *Oncocyclus* species, though from what he showed me and told me in his garden towards the end of his life, it was evident that these hybrids were no more easy to maintain in good health than the *Oncocyclus* species themselves.

The idea of combining the shape and large size of the flowers of the *Oncocyclus* *Irises* with the greater amenability to cultivation of the *Regelia* group seems to have originated with Foster. He

raised many hybrids, most of which have perished now, although a few are still grown by friends to whom he gave plants with his usual generosity.

Following in his footsteps the firm of Van Tubergen of Haarlem made many crosses, for which they were able to use the best of the flowers that appeared among the large importations of the various species which they frequently received when *Oncocyclus* Irises first became widely known, and when there was perhaps a larger demand for them than there appears to be now.

Seeing that the resultant hybrids are now largely grown, the following account of the parentage as supplied to me by Van Tubergen may be of interest.

- (1) Ground-work silvery white, veining brown or lilac.
I. Korolkowi typica × *I. iberica* v. *Houtteana* = Psyche.
 " " × *I. susiana* = Thalia.
 " " × *I. susiana* (selected flowers) = Baucis.
 " " × *I. sofarana magnifica* = Yocaste.
- (2) Very tall strong growers with large lilac blue flowers, heavily veined on a pale lilac ground.
I. Korolkowi violacea × *I. susiana* = Terpsichore.
 " " × *I. Mariae* = Artemis.
 [N.B. The result of the latter cross is particularly noticeable because *I. Mariae* is very dwarf in habit.]
I. Korolkowi violacea × *I. iberica* v. *Houtteana* = Mars.
 " " × *I. susiana* = Helena.
 " *concolor* × *I. iberica* v. *Houtteana* = Persephone.
- (3) Standards of a warm lilac rose hue, the falls veined with greyish brown on a yellow ground; dwarf.
I. Suwarowi × *I. Mariae* = Hecate and Hesperia.
I. vaga × *I. Mariae* = Sophrosyne.
- (4) Flowers of a uniform deep lilac rose, very much like *I. Mariae* but much stronger and taller
I. Korolkowi concolor × *I. iberica* = Eurydice.
I. Korolkowi atropurpurea × *I. Mariae* = Aspasia.
- (5) Various crosses.
I. Korolkowi venosa × *I. atropurpurea* = Charon.
I. Korolkowi violacea × *I. urmensis* = Titania.
I. Korolkowi violacea × (*I. Mariae* × *I. iberica*) = Honoria.
I. Korolkowi violacea × *I. iberica* = Polyhymnia.
I. Korolkowi typica × *I. paradoxa* = Sirona.
I. Leichtlini × (*I. paradoxa* × *I. iberica*) = Hera.
I. Korolkowi typica × *I. Lorteti* = Venus.

If the freedom with which the *Oncocyclus* and *Regelia* sections combine may be taken as a proof that they are closely related, we must also conclude that both these sections are nearly related to the *Pogoniris* section, for hybrids between them are fairly easily obtained. We owe to Foster a whole series of crosses in which *I. paradoxa* and *I. iberica* were crossed with pollen of the large *Pogoniris*, such as *I. pallida*, *I. variegata*, and the *sambucina* hybrids of these two species; but here, as usual, the effect of the combination of the different characters of the parents has been to obscure the colours and to produce combinations of the colours of the parents, which are often more interesting than really beautiful.

No mention has yet been made of what is undoubtedly by far the largest class of Iris hybrids, namely those plants which practically represent the genus in the eyes of many, and which are found in nearly every garden under the misleading title of German Irises.

The parentage of these Irises still remains a mystery, although the evidence available tends to show that the vast majority, at any rate, have arisen as the result of many generations of crosses between two species, namely *I. pallida* and *I. variegata*. These grow in localities in the Tyrol and in Hungary, which do not preclude the possibility of their having been brought together in gardens and cross-fertilized either artificially or by insects in very early days. Other species such as *I. aphylla* and *I. Cengialti*, and the taller Asiatic *Pogoniris* have probably also been used from time to time, and have left clear traces. *I. germanica* has probably not had much influence, for it is certainly not so hardy either as *I. pallida* or as *I. variegata*, both of which are prepared for severe winter weather when they lose their leaves in autumn. *I. germanica*, on the other hand, begins to grow again in the autumn, and late spring frosts often prove fatal to the immature flower stems long before the latter emerge from the shelter of the leaves.

It is unfortunate that it has not yet been possible to prove the result of crossing *I. variegata* and *I. pallida*, chiefly because it was essential to begin with authentic wild plants. Now that these have been obtained, the cross has been made both ways, and before long we may hope to see the result. In the meanwhile, it was of interest to find that the result of crossing *I. trojana* with *I. variegata* was to produce a hybrid, which was remarkably like the so-called *sambucina* and *squalens* forms. The colour was a reddish purple, in which traces of yellow were quite apparent, especially in the smoky appearance of the standards. The beard was also bright orange, and the spathes had that half scarious and half green character, which we should *a priori* expect from the combination of two plants, one of which has wholly green spathes, and the other spathes that are partly scarious when the flowers expand.

If it is thought that *I. pallida* and *I. variegata* will not provide all the characters found in the hybrid, the question arises, "What other species can have been used?" Here we are met with the fact that no trace of any other species except those mentioned is to be found in herbarium collections, if we exclude the *sambucina* and *squalens* forms, whose origin we are trying to discover. Examples of these come only from long-cultivated and inhabited areas and moreover the plants are almost invariably sterile, under conditions in which *I. pallida* and *I. variegata* set seed fairly readily.

Other facts, which would tend to variability in the hybrids of these two species, are that *I. variegata* is apparently liable in the wild state to produce forms in which the yellow ground colour is replaced by white (see p. 169), while *I. pallida* has produced either under cultivation or in the wild state the *plicata* forms with flowers, which are wholly white except for the lavender or purple reticulations bordering the segments (see p. 167).

Another small point is connected with the pale edges, which surround the richly coloured falls of such hybrids as Black Prince, Iriskönig, and Darius. This seemed inexplicable until I found that among a large number of wild examples of *I. variegata* from Hungary which I have recently had the good fortune to see, a certain proportion have a distinctly pale, almost whitish edge. Thus no fresh species is required to account for this feature.

If no list of these garden hybrids is given, the reasons are that, with a few exceptions among the older and well-known varieties, every collection seems to have names of its own and that improvements are constantly being obtained.

RAISING IRISES FROM SEED

The process of raising Irises from seed is, with comparatively few exceptions, much easier and much less tedious than it is usually supposed to be. Among the various divisions of the genus there are considerable differences in the length of the periods that elapse between the sowing of the seed and the time when the plant reaches flowering size. The most precocious of all Irises are the dwarf bearded species; for instance, seeds of *Iris pumila* ripened in July have been known to germinate in the following spring and to produce plants that actually flowered in October in the same year. This is, perhaps, a somewhat exceptional instance but members of bearded and beardless species may be expected to flower within eighteen months of the time when the seeds germinate.

Bulbous species take much longer to come to maturity and seedlings seldom, if ever, flower before their fourth or fifth year.

It is a curious fact and one of which no explanation has yet been offered, that it is the seeds of precisely those species that always produce an abundance of seed that germinate most readily. For instance, of *I. setosa*, *I. versicolor*, and most members of the *sibirica* group, all of which are self-fertilised and of which practically every flower sets seed, every individual seed seems to germinate in the first spring. On the other hand, in the case of the large bearded Irises and of the members of the *Oncocyclus* group, where seed is much less readily obtained, and then only by artificial pollination, germination is infinitely slower and more irregular. If thirty or forty seeds, the contents of a single capsule, are sown at the same time and under identical conditions, it usually happens that only two or three germinate each year and some have been known to lie dormant and yet sound for at least fifteen or eighteen years and then finally to germinate. In a letter written only a month or so before his death, Sir Michael Foster told me that a seed of an *Oncocyclus* hybrid had just germinated with him after lying dormant for eighteen years.

In this connection, it is noticeable that those seeds on which the aril is most marked (see Plate XLVIII, no. 8) are those whose germination is the most irregular.

Another curious fact is that hybrid seeds, resulting from a cross between two species, besides being less numerous also germinate much less readily than those of self-fertilised species.

All Iris seeds seem to germinate most readily in the open air and though a cold house may be an advantage to young seedling plants in early stages, yet thousands of seedling Irises may be raised with no further help than that of a cold frame. Frost and alternate frost and thaw, far from being harmful to dormant seeds, seem to have a beneficial action on the outer coats, although they are sometimes disastrous to minute seedlings.

With regard to the period at which the seeds should be sown, a distinction must therefore be drawn between bulbous and non-bulbous species, unless the gardener is so fortunate as to have unlimited accommodation for seedlings during the winter in a cold house or well-ventilated frames. In this case, seedlings of non-bulbous species that germinate in the autumn can be kept through the winter though it is not always easy to prevent damping off.

As a general rule, it may be taken that the seeds of bulbous species should be sown as soon as the capsules burst, while those of the non-bulbous species should be kept until late September or early October. If the seeds are sown earlier, germination will often take place about that time. If the seedlings are left in the open, many will be uprooted by frosts and if taken under cover some may damp off. Although most Iris seedlings are so hardy that, even when drawn out of the ground by

frost, they may be replanted and suffer little from the experience, yet it is better, on the whole, to postpone the sowing of non-bulbous species until the autumn.

It is possible that, under other conditions of soil and climate, other methods of procedure would be preferable, but on sandy soil in Surrey my practice is to sow all Iris seeds in pots and to sink the pots up to the rim in the open ground, merely covering them with large strawberry guards to keep birds from scratching out the soil, as they are otherwise apt to do, when the pots are kept moist in periods of drought.

In the case of the bulbous species, the pots should be large, 5—6 in. in diameter, and of the usual depth, but the seeds of the other species, which are transplanted soon after germination, may be sown in somewhat shallower seedpans with the advantage that less prepared soil is needed to fill them—a saving which may well appeal to the amateur.

Drainage is important, seeing that the pots may have to stay several years in the ground, and I have found it expedient to abandon the usual broken fragments of pots in favour of patent "corks," consisting of a circle of wire gauze, bound round with a narrow edge of metal. Drainage of the old kind, however carefully arranged, seems to become choked eventually with the result that moss forms on the surface and the seeds rot. With the wire gauze, however, covered with a good layer of moss, perpetual drainage is apparently assured.

The soil used to fill the pots can be made rich with leaf soil and very old manure, and in the case of bulbous species it is as well to fill the pots three parts full of a mixture consisting of little more than equal quantities of these two constituents. The top inch or two in which the seeds are actually sown should have a larger admixture of sandy soil, not too finely sifted. The seeds should be covered by about half an inch of soil. Those of the *Pogoniris*, *Oncocyclus*, and *Regelia* sections may be sown thickly, for only a few will usually germinate in any one year, while the individual seeds of species belonging to the other groups should be placed not less than $\frac{3}{8}$ or $\frac{1}{2}$ inch apart.

The seeds of the various species are very variable as to the time of year at which they may be expected to germinate, but as a general rule the period of germination roughly coincides with the reappearance of active growth in the dormant mature plants. Thus seeds of the *Xiphium* Irises germinate in autumn, those of the *reticulatas* in mid-winter and those of the *Juno* group soon after Christmas, when the tips of the growths from the reawakening bulbs are just piercing the soil. On the other hand, seedlings of *I. nepalensis* do not appear until late in April or early in May, which is precisely the time when this curious Iris begins to show signs of returning life after its long sleep, which lasts from the end of October until that time.

Seedlings of bulbous species that germinate in mid-winter appear to be hardy to a surprising degree but at the same time nothing is lost by giving them the protection of a cold frame, in which the pots should be sunk to the rim in ashes, for it is important that they should make as much growth as possible in order to be able to form strong bulblets. As the days lengthen in spring and the power of the sun increases, the watering of these pots in frames becomes an important matter, for it is essential not to check the growth by allowing the soil to become too dry. The frames should be open whenever the weather is favourable, and air at all times is desirable.

As April passes into May, the leaves of the *Junos* and *reticulatas* will show signs of turning yellow, and then all water must be withheld and the bulblets allowed to ripen off their growth. When the leaves are withered, the pots may be turned out and the bulblets sifted out and stored in sand until planting time in September. If the frames are not wanted for other purposes, the lights may be left on and the pots undisturbed until the actual planting time has arrived. Where possible, this latter plan is perhaps preferable, for no small bulb is improved by being kept out of the ground for any length of time.

Seeds of bulbous Irises germinate well in prepared beds of rich light soil in the open, but this plan has disadvantages. Either the seeds must be so thinly sown that the plants may be left to flower in the seed-beds or the bulblets must be lifted, and it is by no means so easy to find bulblets in the open ground as to sift them out of pots of soil.

The non-bulbous species are somewhat later in germinating and, unless the weather is exceptionally severe, no attention need be given to the pots except to keep down weeds and to prevent the soil becoming so dry that the seeds cannot germinate. When the young plants have produced three or four leaves and grown to a few inches in height they should be planted out in their permanent quarters. In favourable weather, even the smallest plants consisting only of a leaf and the radicle can be successfully planted out, but it is usually better to wait until three or four leaves and a number of roots have developed.

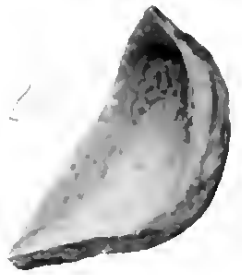
In dull wet seasons, when the capsules of seed do not ripen readily on the plants, they may be picked, while still green, as soon as the seeds begin to turn from green to pale brown and the ripening process may then be continued in some dry warm place under cover.



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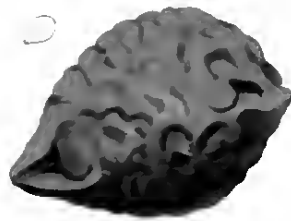
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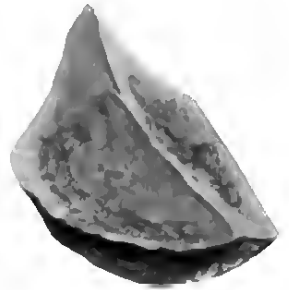
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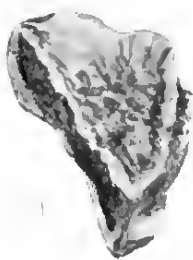
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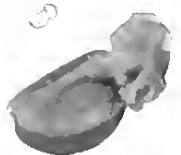
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ORRIS ROOT

This product of the Iris is apparently derived in Tuscany from *I. germanica*, and *I. pallida*. These species are known to the peasantry under the common name of Giaggiolo. The rhizomes are dug up in August and are then trimmed, peeled and dried in the sun and sold to dealers, who export them from Leghorn and Trieste. The pieces have a flattened, shrivelled appearance and bear on the under surface a number of small roundish scars where the roots have been removed. Their taste is bitterish, faintly aromatic and subsequently acrid, and they have a faint odour of violets. This odour is not present in the fresh rhizomes, which have simply an earthy smell, but is gradually produced by drying and keeping, not being fully developed until the rhizomes are two years old.

The characteristic constituent of orris rhizome would appear to be a solid crystalline substance, called orris camphor, which is always found on the surface of the distillate when orris rhizome is distilled with water. The amount is said to be about 0.12 per cent.

At the present day the powdered orris root is chiefly used as an ingredient in tooth powders and in perfumery, but the report for 1900 of the British vice-consul for Leghorn mentions other curious industries in which orris root plays the chief part. One is the production of beads made from the root, with a fine hole through the centre. The beads are of many sizes, the smallest being about that of a marble. Not many years ago about twenty millions of these were exported every year, but now the number has fallen to four millions. It appears that there was once a medical theory that the best means of curing scrofula and certain diseases of the blood was to keep an open wound in the body of the sufferer and these orris-root beads were inserted into the wound for this purpose. It is still possible to buy from Italian medical instrument makers the special wire-grated bandage prepared for the arm in this process. Orris was probably used in this way because of its tendency to dilate in any liquid substance. The practice undoubtedly still prevails, though medical science has long condemned it. A factory for making these beads has recently been established at Paris, and the greater part of the Leghorn export goes to Lyons, while part goes to Frankfurt. The use of the beads is dying out in Italy, but it is not uncommon to meet people who have been treated in this way.

Another article made from orris root is the dentarnolo, or finger, which is designed to take the place of the old-fashioned infants' coral and assist in teething. This is a modern and a growing industry and apparently reached Italy from Germany. In 1900 half a million of these fingers were sent from Leghorn to Germany and Austria. Orris-root grains, coloured in blue, red, yellow, green, and other colours, are exported to the same countries, where they are used to throw on fires to give an agreeable odour, while in the form of tiny chips the root is chewed, mostly by menservants, to remove the smell of tobacco, garlic and the like.

UNIDENTIFIED SPECIFIC NAMES

The plants described under the following names cannot be identified with certainty. In many cases, they were hybrids of garden origin and in others the description is so meagre and unsatisfactory that identification can only be tentative.

I. Agatha × Hort. ex The Garden, XLVI. p. 157 (1894).

I. aplylla Hort. A synonym of *I. plicata*.

I. atrovioleacea, Lange in Bot. Tidssk. XIII. (1882), p. 18. ? = *I. germanica atropurpurea* or *I. Kochii*.

I. autumnalis, Tausch in Flora, XVII. p. 522 (1834). ? = *I. spuria* var. *halophila*.

I. bicolor, Miller, Gard. Dict. ed. VIII. no. 13 (1868). ? = *I. spuria* variety.

I. Boltoniana, Roehm. et Schult. Syst. Veget. Mant. I. p. 308 (1822).

I. Boltoniana, Hort. ex Regel, Ind. Sem. Hort. Petrop. 1860, p. 31. ? = *I. versicolor*.

I. brachycarpa, Lodd. ex Steud. Nom. ed. II. I. p. 821 (1840).

I. brevicaulis, Rafin. Fl. Ludov. p. 20 (1817).

I. Burnati, Baker, Hdk. Irid. p. 33 (1892).

This was only found once by Burnat and Townsend in 1872 on the rocks below Eze, Alpes Maritimes (K). There is apparently no trace of it now in that locality. It seems to be nothing more than a strong growing form of *I. chamaeiris* with deep purple flowers, and closely resembles specimens of the variety, called *olbiensis*, from Hyères, when they have developed under cultivation in good soil.

I. caesia, E. Berg in Flora, XVIII. p. 563 (1835). A hybrid Pogoniris.

I. cardiopetala, Borbas in OBZ. XXXVIII. p. 325 (1888). A form of *I. spuria*.

I. Comitissae, Andry ex Trautv. in Act. Hort. Petrop. IX. p. 240 (1884).

I. convoluta, Rafin. New Fl. Am. II. 92 (1836).

I. cucullata, Schur in Verh. Siebenb. Ver. Naturw. IV. p. 74 (1853). Possibly a hybrid between *I. pallida* and *I. germanica*.

I. desertorum, Gueldenstadt Reisen, I. p. 80 (1787).

I. desertorum, Balbis, Cat. Hort. Taur. 1813, p. 44.

- I. Dierinckii*, Hort. Berol. ex C. Koch, Ind. Sem. Hort. Berol. 1853, p. 17.
This is said to be akin to *I. spuria* but smaller in all its parts. The specimen in the Berlin herbarium (1887) is however *I. versicolor* (B).
- I. diluta*, Bieb. Cent. Pl. Ross. t. 81. This was probably a form of *I. spuria*.
- I. dubia*, Poir. Encyc. Suppl. III. p. 184 (1813).
- I. Duerinckii*, Buckl. in Am. Journ. Sc. XLV. p. 176 (1843).
- I. elegans*, Pers. ex Steud. Nomen. ed. II. I. p. 82 (1840).
- I. erratica*, Hort. ex Baker in Gard. Chron. 1876, II. p. 583.
This is probably a form of *I. spuria* var. *halophila*.
- I. erratica*, Tod. Nuov. Gen. e Spec. p. 10 (1858), *Bot. Mag. t. 6894, sub nom. *I. Statellae*.
This is probably a garden hybrid of *I. chamaeiris* or of *I. pseudopumila*.
- I. Falconeriana*, Penny in Hort. Eps. ed. II. (inedit.) ex Loud. Gard. Mag. V. p. 471 (1829).
This is probably *I. tripetala*, Walt.
- I. frigida*, Bunge ex Bess. in Flora, XVII. I. Beibl. p. 25 (1834).
- I. fulgida*, E. Berg in Flora, XVIII. p. 568 (1835).
Probably a hybrid garden Pogoniris.
- I. geminiflora*, Besser in Flora, XV. II. Beibl. p. 11 (1832).
- I. germanica*, Falk, Beitr. II. p. 101 (1786).
This came from the upper reaches of the Irtysh and is probably either *I. scariosa* or *I. Alberti*.
- I. gloriosa*, Reider ex E. Berg in Flora, XVI. I. Beibl. p. 17 (1833).
This is possibly a synonym of *I. Swertii*.
- I. Gmelini*, Ledeb. in Denkschr. Bot. Ges. Regensb. III. p. 48 (1841).
- I. gracilis*, E. Berg. in Flora, XVIII. p. 568 (1835). A dwarf hybrid Pogoniris.
- I. graminifolia*, Pallas Reise, III. pp. 584, 653 (1771).
- I. graminifolia*, Freyn in OBZ. XLIV. p. 326 (1894). ? = *I. Kerneriana*.
- I. graminiflora*, Ledeb. Fl. Ross. IV. p. 106 (1853). This is apparently a mistake for *I. geminiflora*.
- I. Guldenstaedtia*, J. F. Gmelin, Syst. p. 115. Was apparently intended for *I. Guldenstadtiana*.
- I. Guldenstaedtii*, Hoffm. Verz. Pfl. Nachtr. II. p. 141. Was apparently intended for *I. Guldenstadtiana*.
- I. haematophylla*, Fischer ex Link, Enum. Hort. Berol. I. p. 60 (1821).
This is probably a synonym for *I. ensata*.
- I. hortensis*, Tausch in Flora, XI. p. 235 (1828).
- I. Humei*, G. Don ex Loud. Encycl. Pl. Suppl. I. p. 1150 (1855).
This is possibly a form of *I. germanica*.
- I. humilis*, Schur, Enum. Pl. Transs. p. 657 (1866).
This is probably a synonym of *I. ruthenica*.
- I. hybrida*, Retzius, Fasc. Obs. Bot. (1774). (This reference remains unverified.)
- I. laciniata*, Hort. Hamb. ex E. Berg in Flora, XVI. I. Beibl. p. 28 (1833).
A malformed garden hybrid.
- I. latifolia*, Gilib. Exercit. II. p. 497 (1793).
This has been identified with *I. germanica*, which, however, has relatively somewhat narrow leaves for the size of the plant. It was probably a garden hybrid.
- I. lilacina*, Borb. ex Nym. Consp. p. 702 (1882).
Probably a form of *I. spuria*.
- I. limbata*, Bess. ex Steud. Nom. ed. I. p. 438 (1821).
This is possibly a synonym of *I. variegata* or a variety of that species.
- I. livida*, Booth ex E. Berg in Flora, XVI. I. Beibl. p. 30 (1833).
This is possibly a purple-flowered form of *I. Reichenbachii*.
- I. longiflora*, Vest. ex Roem. et Schult, Syst. Mant. I. p. 304 (1822).
Probably a hybrid or form of *I. chamaeiris*.
- I. majoricensis*, Barcelo, Fl. Balear. p. 446 (1881).
Probably a synonym of *I. albicans*.
- I. mandraliscae*, Tod. Nuov. Gen. e Spec. p. 42 (1861).
This is either a form or a hybrid of *I. pallida*.
- I. mandraliscae*, Tineo ex Tornab. Fl. sicula, p. 512 (1887).
Probably a white-flowered form of *I. sibirica*, which had escaped from cultivation.
- I. Marchesetti*, Pampan. in Bull. Soc. Bot. Ital. 1908, p. 136.
A form of *I. pallida* or of *I. Cengialti* var. *illyrica*, or a hybrid between them, from the Scoglio Bobara near Ragusa.
- I. Matthioli*, Tausch in Flora XII. I. Erg. p. 48 (1829).
A yellow-flowered garden Pogoniris.
- I. minima*, Herb. Johann ex Vest. in Roem. et Schult. Mant. I. p. 313 (1817).
Possibly a synonym of *I. minuta*.
- I. Moggridgei*, Baker, Hdk. Irid. p. 34 (1892).
Baker's type (K) appears to be a garden hybrid of *I. chamaeiris*.
- I. musulmanica*, Fomin in Monit. Jard. Bot. Tiflis 1909, no. 14, p. 46.
Probably a synonym of *I. spuria* var. *halophila*.
- I. Myleri*, C. Koch in Koch und Fint. Wochenschr. 1859, p. 206.
A dwarf yellow-flowered garden Pogoniris.
- I. ochroleuca*, Ker-Gawl. Irid. Gen. p. 48, ex parte = *I. Monnieri*.
- I. odorata*, Pers. Syn. I. p. 53 (1805).
- I. officinalis*, Salisb. Prod. p. 43 (1796).
- I. pallida*, Salisb. Prod. p. 44 (1796). Probably a synonym of *I. spuria* var. *halophila*.
- I. pedunculata*, Medic. in Act. Acad. Theod. Palat. VI. (Phys.), p. 417 (1790).

- I. picta*, Miller, Gard. Dict. ed. VIII. no. 16 (1768).
I. propendens, Lange in Bot. Tidsskr. XIX. p. 255 (1895).
I. pseudopulcherrima, E. Berg in Flora XVIII. p. 570 (1835).
 A dwarf Pogoniris, probably of hybrid origin.
I. pseudosibirica, Schur, Enum. Pl. Transs. p. 657 (1866).
I. pseudovariegata, Leichtlin in The Garden LX. p. 418 (1899).
I. pulcherrima, E. Berg in Flora XVI. 1. Beibl. p. 34 (1833).
 A dwarf Pogoniris, probably of hybrid origin.
I. pumila, Savi, Bot. Etrusc. II. p. 10 (1815).
I. purpurascens, E. Berg in Flora XVIII. p. 569 (1835).
 A dwarf Pogoniris, probably of hybrid origin.
I. pyrenaica, Linn. Cent. Plant. 1. p. 4 (1755).
 If this was really a Pogoniris, it was probably *I. chamaeiris*.
I. repanda, E. Berg in Flora XVIII. p. 565 (1835).
 Probably a hybrid garden form of *I. germanica*.
I. rubescens, Rafin. Fl. Ludov. p. 20 (1817).
I. rupestris, Salisb. Prod. p. 43 (1796).
I. sabina, N. Terrac. in Atti Instit. Incorag. Napoli v. vol. 1. no. 5, p. 7 (1899).
 Found on Monte Gennaro in the Sabine Hills. It appears to be a variety of *I. aphylla*, but in that case it is probably not indigenous there.
I. salsa, Pallas Reise, II. p. 461 (1772). This is probably a yellow flowered *I. spuria* var. *halophila*.
I. sativa, Miller, Gard. Dict. ed. VIII. no. 15 (1768). Possibly a synonym for *I. pseudacorus*, see p. 77.
I. sibirica, Hook. and Arnott, Bot. Beech. Voy. p. 117 (1830-41).
 This has been identified with *I. setosa*.
I. sicula, Tod. Nuov. Gen. e Spec. 1. p. 7 (1856).
 This appears to be an oriental ally of *I. germanica*, possibly synonymous with *I. trojana* or *I. cypriana*.
I. sordida, Retzius, Fasc. Obs. Bot. VI. (1774).
I. sordida, Solander ex Salisb. in Trans. Hort. Soc. 1. p. 303 (1812) = *I. xiphium* var. *lusitanica*.
I. sordida, Willd. Enum. Hort. Berol. Suppl. p. 4 (1813).
I. spathacea, Jaime St Hil. 19, t. 27, ex Roem. et Schult. Syst. 1. p. 468 (1817).
I. spathulata, Cav. Desc. p. 298 (1827).
I. spectosa, N. Terrac. in Atti Instit. Incorag. Napoli v. vol. 1. no. 5, p. 4 (1899).
 This is probably a synonym of *I. pseudopumila*. The type was collected near Benevento at S. Maria a Tuoro.
I. spectabilis, Spach in Ann. Sc. Nat. Sér. III. v. p. 93 (1846).
 This is a form of *I. xiphium*, possibly the variety known in gardens as Thunderbolt with brown and yellow falls and purplish standards.
I. spuria, Pallas, Iter III. p. 713 = ? *I. ensata*.
I. squalens, Petagna, Inst. Bot. II. p. 88 (1787).
I. squalens, Georgi, Besch. Russ. Reich. III. p. 668 (1789). This is probably a synonym of *I. variegata*.
I. suaveolens, A. Terrac. in Nuov. Giorn. bot. ital. ser. II. i. p. 182 (1894).
 Cf. N. Terrac. in Atti Instit. Incorag. Napoli v. vol. 1. no. 5, p. 10 (1899).
 This Iris from the Campanian Hills is probably a form or hybrid of *I. germanica*.
I. suaveolens, Boiss. et Reut. Diagn. Ser. 1. XIII. p. 15 (1853).
 This plant was found at Kustendje in Bulgaria and was probably a form either of *I. pumila* or of *I. Reichenbachii*.
I. superba, E. Berg in Flora XVIII. p. 567 (1835).
 Probably a hybrid garden Pogoniris.
I. tangerica, Hort. Chels. ex G. Don in Loud. Hort. Brit. ed. II. p. 19 (1832).
I. tardiflora, E. Berg in Flora XVIII. p. 566 (1835).
 Probably a hybrid garden Pogoniris.
I. Tenoru, Parl. Fl. Ital. III. p. 278 (1858).
 This is possibly a synonym of *I. aphylla*.
I. Tinai, Tod. Nuov. Gen. e Spec. III. p. 46 (1861).
I. torta, Tausch in Flora XVII. p. 523 (1834).
I. venusta, Booth ex E. Berg in Flora XVI. 1. Beibl. p. 31 (1833).
 A garden Pogoniris, probably one of the numerous *sambucina* or *squalens* hybrids of *I. variegata* and *I. pallida*.
I. verna, Pall. Reise III. p. 213 (1773). This is probably a synonym of *I. ruthenica*.
I. vernalis, Salisb. Prod. p. 44 (1796). Possibly a synonym of *I. verna*.
I. versicolor, Thunb. Fl. Jap. p. 34 (1784). The Japanese name is given as Ayame, which, however, properly belongs to *I. orientalis*. It may have been *I. setosa*, for which the Japanese is Hiôgi-ayame.
I. violacea, Klatt in Linnaea XXXV. (1867-68), p. 384.
I. virgata, Rafin. New Fl. Amer. II. p. 92 (1836).
I. Wittmanniana, Hort. ex Baker in Gard. Chron. 1876, II. p. 583.
 This is probably a synonym of *I. spuria* var. *halophila*.
I. xiphium, St Lag in Ann. Soc. Bot. Lyon VII. p. 128 (1880).
 This is a synonym of *I. xiphium* and is quoted as an example of a proposed new system of nomenclature.
I. xiphium, Georgi, Reise 1. 196.
I. yedoensis, Franch. et Savat. Enum. Pl. Jap. II. p. 522 (1879). This appears to have been merely *I. setosa*, a supposition confirmed by the fragmentary specimen, Yedo, 1871, Savatier, no. 1223 (P).

LIST OF PLANTS WRONGLY DESCRIBED AS IRISES

The nomenclature used is that of Baker's Handbook of the Irideae.

- I. angusta*, Thunb. Diss. Irid. p. 19 = *Moraea angusta*.
- I. bicolor*, *Lindley, Bot. Reg. t. 1404 = *Moraea bicolor*.
- I. bispathacca*, Spach, Hist. Vég. Phan. XIII. p. 15 = *Hermodactylus tuberosus*.
- I. bituminosa*, Linn. f. Suppl. p. 98 = *Moraea viscaria* var. *bituminosa*.
- I. brachystigma*, Scheele in Linnaea XXII. p. 348 (1849) = *Herbertia Drummondiana*.
- I. capensis*, Burm. Fl. Cap. Prod. p. 2 = *Moraea edulis*.
- I. catenulata*, Baker in J. L. S. XVI. p. 147 (1877) = *Moraea catenulata*.
- I. ciliata*, Linn. f. Suppl. p. 98 = *Moraea ciliata*.
- I. clandestina*, Lehm. Sem. Hort. Hamb. 1828, p. 16 = ?
- I. compressa*, Linn. f. Suppl. p. 98.
Thunb. Diss. Irid. p. 12 = *Moraea iridioides*.
- I. crassifolia*, *Lodd. Bot. Cab. t. 1861 = *Moraea iridioides*.
- I. crispa*, Linn. f. Suppl. p. 98 = *Moraea crispa*.
- I. diversifolia*, Steud. ex A. Rich. Tent. Fl. Abyss. II. p. 305 = *Moraea diversifolia*.
- I. edulis*, Linn. f. Suppl. p. 98 = *Moraea edulis*.
- I. floridana*, Rafin. New Fl. Am. II. p. 92 (1836) = ?
- I. fugax*, Pers. Syn. I. p. 54 = *Moraea* ?
- I. glutacea*, Rafin. New Fl. Am. II. p. 93 (1836) = ?
- I. gracilis*, Licht ex Roem. und Schult. Syst. I. p. 477 = *Moraea tenuis*.
- I. hirsuta*, Licht l.c. p. 478 = *Moraea papilionacea*.
- I. imberbis*, Van Hazen, Cat. Arb. et Pl. p. 67.
*Ker-Gawl. in Bot. Mag. t. 1238 = *Moraea candida*.
- I. lacera*, Lam. Encyc. III. p. 304 = *Moraea polystachya*.
- I. longifolia*, *Schneev. Ic. t. 20 = *Moraea edulis*.
- I. martinicensis*, Jacq. Enum. Pl. Carib. p. 12 = *Trimesia martinicensis* (*Lausbergia caracasana*).
- I. minuta*, Linn. f. Suppl. p. 98 = *Moraea ciliata* var. *minuta*.
- I. moraeoides*, Ker-Gawl. in Bot. Mag. sub t. 1407 = *Moraea iridioides*.
- I. mutila*, Licht ex Roem. und Schult. Syst. I. p. 477 = *Moraea* ?
- I. Northiana*, Pers. Syn. I. p. 52 = *Marica Northiana*.
- I. papilionacea*, Linn. f. Suppl. p. 98 = *Moraea papilionacea*.
- I. pavonia*, *Curt. in Bot. Mag. t. 168 = *Moraea glaucopsis*.
- I. pavonia*, Linn. f. Suppl. p. 98 = *Moraea pavonia*.
- I. picta*, Bot. Gart. Halle, p. 50 (1800) = *Moraea* ?
- I. plumaria*, Thunb. Diss. Irid. p. 15 = *Moraea iriopetala*.
- I. polystachya*, Thunb. l.c. p. 25 = *Moraea polystachya*.
- I. ramosa*, Thunb. l.c. p. 18 = *Moraea ramosa*.
- I. ramosissima*, Linn. f. Suppl. p. 99 = *Moraea ramosa*.
- I. Robinsoniana*, F. Muell. Frag. VII. p. 153 = *Moraea Robinsoniana*.
- I. Robinsonii*, Hort. ex Gard. Chron. 1888, II. p. 263 = *Moraea Robinsoniana*.
- I. setacea*, Thunb. Diss. Irid. p. 20 = *Moraea setacea*.
- I. setifolia*, Linn. f. Suppl. p. 99 = *Moraea setacea*.
- I. silvestris*, Vell. Fl. Flum. p. 34, t. 82 = ?
- I. spathacca*, Thunb. Diss. Irid. p. 17 = *Moraea spathacca*.
- I. spathulata*, Linn. f. Suppl. p. 99 = *Moraea spathacea*.
- I. tricuspidata*, Linn. f. Suppl. p. 98 = *Moraea tricuspis*.
- I. tricuspis*, Thunb. Diss. Irid. p. 14 = *Moraea edulis*.
- I. tricuspis*, Willd. Sp. Pl. I. p. 231 = *Moraea tricuspis*.
- I. tripetala*, Linn. f. Suppl. p. 94 = *Moraea tripetala*.
- I. tristis*, Linn. f. l.c. p. 97 = *Moraea tristis*.
- I. tuberosa*, Linn. Sp. Plant. ed. I. p. 40 (1753) = *Hermodactylus tuberosus*.
- I. unifolia*, Schrank in Denkschr. Bot. Ges. Regensb. II. 1822, p. 173 = ?
- I. villosa*, *Ker-Gawl. in Bot. Mag. t. 571 = *Moraea pavonia*.
- I. viscaria*, Linn. f. Suppl. p. 98 = *Moraea viscaria*.

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The names printed in heavy type are those of the species; those in italics appear to be synonyms or indicate hybrids. The heavy numerals give the reference to the full description of each species.

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Erratum et corrigendum

On p. 46 for *I. Massue* read *I. Mastue*



